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REPORT ON PROCEEDINGS
UNDER THE
PRAIRIE FARM REHABILITATION ACT
FOR THE FISCAL YEAR ENDING MARCH 31, 1941

1940/41

DEPARTMENT OF AGRICULTURE
OTTAWA, CANADA

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REPORT ON PROCEEDINGS UNDER THE
PRAIRIE FARM REHABILITATION ACT
FOR THE FISCAL YEAR ENDING MARCH 31, 1941

Foreword

This report covers the sixth year of work conducted by the Dominion Department of Agriculture under the Prairie Farm Rehabilitation Act (P.F.R.A.). Activities in previous years have been fully outlined in annual reports covering each of the fiscal years 1935-36, 1936-37, 1937-38, 1938-39, and 1939-40. In the following Report the plan and progress of P.F.R.A. work since 1935 is presented in brief outline, followed by more detailed accounts of the various phases of the work in 1940-41.

THE PRAIRIE FARM REHABILITATION ACT

The Prairie Farm Rehabilitation Act (25-26 George V, C.23) was passed by the Parliament of Canada in April, 1935, "to provide for the rehabilitation of drought and soil-drifting areas in the provinces of Manitoba, Saskatchewan and Alberta". Under the terms of this Act the Minister of Agriculture was authorized to introduce throughout the affected area those "systems of farm practice, tree culture, and water supply that will afford greater economic security" to the agricultural population. By an amendment to the Act in March, 1937 (1 George VI, C.14) "land utilization and land settlement" were included as additional objectives, while a later amendment in March, 1939 (3 George VI, C.7) removed the original five-year limit to the currency of the Act.

The area coming under the provisions of the Prairie Farm Rehabilitation Act extends along the International Boundary from the Red River in Manitoba to the Rocky Mountains, south of an irregular line running from Winnipeg to Kamsack, Saskatchewan, thence northwest to Township 53 on the Saskatchewan-Alberta boundary, and thence southwest to the vicinity of Banff, Alberta. This line is more exactly shown in Map 1, which accompanies this report.

In accordance with the terms and intentions of this Act there has been organized, throughout the drier regions of the Prairie Provinces, a rehabilitation program which has as its main objective the adjustment of prairie agriculture to new conditions imposed by the severe droughts of the 1930-1937 period and by depressed conditions affecting western grain production since 1929. This rehabilitation program covers three main phases of work:

1. Land Utilization - The removal of poor land from cultivation and the return of such land to grazing.

2. Water Development - The conservation of the limited surface water resources in the P.F.R.A. area for agricultural use,

3. Cultural - The improvement of actual farming practices.

The initial development of the P.F.R.A. program was effected through the facilities of the Experimental Farms Service of the Dominion Department of Agriculture. As the program

expanded a separate Prairie Farm Rehabilitation administration was set up at Regina, Saskatchewan, to direct the work of land utilization and water development, while the Experimental Farms continued to promote the "cultural" program.

The P.F.R.A. Land Utilization Program

Under the P.F.R.A. Land Utilization program, efforts have been made for the permanent removal from cultivation of land which, by reason of low fertility, poor texture or aridity, has proved submarginal for crop production. Farmers in operation on such land have been moved to better areas, and the land so vacated or previously abandoned has been fenced in for use as P.F.R.A. Community Pastures. Between 1937, when this phase of P.F.R.A. work was started, and March 31, 1941, community pastures have been established in 54 localities covering a total of 1,158,180 acres. In this manner the unprofitable use for crop production of a large acreage of submarginal land has been stopped and provision made for its profitable use through grazing.

The P.F.R.A. Water Development Program

The Water Development program initiated by the P.F.R.A. aims at increasing the supply of water for use on prairie farms by the greatest possible conservation of run-off. Hitherto, the optimum use of many tracts of land on the Canadian prairies has not been possible because of inadequate water supply for domestic and stockwatering purposes. Under the P.F.R.A. engineering and financial assistance has been provided for individuals and communities to construct dugouts, dams or water diversion structures, for the conservation of run-off water from melting snow which would be otherwise lost through stream-flow. Provision can thus be made for year-round supplies for domestic and stockwatering uses, and for a limited amount of irrigation. In this manner, the normal shortage of water on many prairie farms is overcome.

From the initiation of the Water Development program in 1935 to the end of March, 1941, the P.F.R.A. has been instrumental in constructing 15,246 small water development projects on private farms, 400 small community projects, and 67 large community projects. The majority of these projects are for water storage, but 905 of the small projects on private farms, 15 small community projects and 26 large community projects have been constructed for irrigation purposes. The total irrigable area covered by P.F.R.A. projects is in the neighborhood of 170,000 acres. The significance of this water development program is that it has released many thousand prairie farmers from exclusive dependence on cereal production, and has enlarged the capacity for live stock production of the Canadian prairies by several hundred thousand head. In view of the adverse conditions affecting the grain trade of Canada, the timeliness of the water development program is obvious.

The P.F.R.A. Cultural Program

Insofar as the P.F.R.A. program affects the technique of crop and livestock production on the prairies, it constitutes a special phase of the work of the Experimental Farms Service. This Service has been in intimate contact with, and has made many contributions to, the development of prairie agriculture.

With the initiation of the rehabilitation program in 1935, the investigational and demonstrational work of the Experimental Farms was considerably expanded throughout the drought area, special attention being given to the problems of soil drifting control, land reclamation and farm home improvement.

By 1940 P.F.R.A. work was in progress on 7 Dominion Experimental Farms, 46 District Experiment Sub-Stations, 17 land reclamation projects, 813 regrassing projects, 4 large tree planting experiments, 4 large and many small irrigation projects and on various special projects. In the aggregate, approximately 72,000 acres were used in this work for experimental and demonstrational purposes. Contacts with farmers were maintained through some 33,500 members of the 210 Agricultural Improvement Associations, which are sponsored by the P.F.R.A. In addition, the Experimental Farms continued to co-operate with the Prairie Farm Rehabilitation Administration at Regina in the development of irrigation projects and community pastures.

Throughout the course of P.F.R.A. cultural work the aim has been to encourage and assist farmers in solving their own problems. Material assistance has been limited to such supplies as would enable farmers and particularly communities, to initiate desirable new lines of work, for which the farmers' resources were inadequate. This policy has had a tonic effect on agrarian morale. In general, cultural improvements have been effected through demonstrations, judiciously located, and based on the results of experiments and on the collective experience of many agriculturists. Participation in the program by farmers has been secured through the activities of the Agricultural Improvement Associations through personal contacts established by the several Experimental Farms, and through the co-operation of provincial extension organizations.

Considerable improvements, during the first five years currency of the P.F.R.A., which have been effected in the technique of prairie farming may be attributed to the cultural program. One outstanding improvement has been to control soil drifting, effected largely through the adoption of strip farming and related practices. It is important to note that the efficacy of soil drifting control measures were conclusively demonstrated and applied during drought years, prior to the return of relatively favourable climatic conditions in 1938. Another cultural improvement has been to minimize the adverse effect of drought on crop yields through increased frequency of summerfallow. On the domestic side, there has been a marked increase in vegetable and fruit gardening, together with tree planting, in which P.F.R.A. assistance in small scale irrigation has proved highly beneficial. These forms of farm home improvement have not been promoted with a view to making prairie agriculture entirely self sufficient, an objective which the climate would render impracticable, but rather to enable the farmer to survive the occasional hazards encountered in the exclusive production of grain crops and to improve rural living conditions. The effect of the foregoing improvements, combined with others resulting from the P.F.R.A. program, in particular, and from the long time research work of the Experimental Farms in general, has been to compensate to an appreciable degree for hardships imposed on prairie farmers by prevailing low prices for wheat.

PROGRESS OF LAND UTILIZATION UNDER THE P.F.R.A. PROGRAM

The principal function of land utilization work under the P.F.R.A. is to improve the relationship between the quality of land and its agricultural use. In practice, this is very largely a question of establishing grazing on land which is unfit for crop production.

During the period of agricultural settlement in the Prairie Provinces, some areas of submarginal land were broken up for crop production. Much of this land was subsequently

abandoned and returned to its previous use, for grazing, but a considerable acreage remained under cultivation with little hope of economic returns. Under the P.F.R.A. efforts are being made to remove from cultivation such submarginal lands as are still being farmed, and to ensure that submarginal lands as a whole shall not be brought under cultivation in the future. Furthermore, it is proposed that such lands shall be put to their logical use as grazing areas, under definite range and livestock improvement policies. An outstanding result of P.F.R.A. work in this respect is the formation of Community Pastures described on pages 7-15 of this Report. The Special Municipal Areas Board of Alberta, the Land Utilization Board of Saskatchewan, and some of the provisions of the new Land Rehabilitation Act of Manitoba, are examples of provincial activity in this respect, with which the P.F.R.A. Administration works in co-operation.

Land Utilization work under the P.F.R.A. falls into four broad classes, namely:

1. Economic Research
2. Community Pastures
3. Land Settlement
4. Development of Irrigation Projects.

Progress on each of these classes is briefly outlined below:

ECONOMIC RESEARCH

The programme of economic research conducted by the Economics Division, Marketing Service, Dominion Department of Agriculture, in co-operation with the Universities of Saskatchewan and Alberta, was carried forward during the year. The emphasis of these projects is still on land classification but additional farm management data were secured to meet the needs of a war-time situation and to provide budgetary information basic to the extension of land classification in the two provinces.

Land Classification in Saskatchewan Nine Municipalities, No's. 193, 194, 195, 223, 224, 225, 226, 227 and 228, were included in the land classification survey in the summer of 1940. The data secured were analyzed during the fall and winter months and preliminary classification is now complete.

In addition to this study, information relating to mortgage indebtedness was obtained through the co-operation of several large loaning agencies operating within the province. The study covered the period of sixteen years from 1921 to 1936 inclusive. Among the information secured, is that relating to repayment of loans. During the period 1921 to 1928, the average annual payments on principal and interest per one thousand dollars of the original loan varied from $99.00 in Land Class I to $128.00 in Land Class V. After 1929, payments were drastically reduced and on many accounts very little was paid during the remainder of the period under review. This resulted in a large accumulation of arrears for the accounts which were still open. Over the sixteen-year period, the average annual payments on principal and interest per $1,000 of original loan varied from $61.00 for loans in Land Class I to $89.00 for loans in Land Class V.

At the end of the period studied, of the 1,287 mortgage loans, 46 per cent were still current, the balance had been closed. Of the closed accounts, 46 per cent were paid off by the borrower 26 per cent were paid off from the proceeds of another loan, 5 per cent by the sale of the land and 21 per cent of the accounts had been closed by foreclosure proceedings.

Concerning foreclosures, at the end of the first eight-year period, 22.4 per cent of the loans which had been placed on land in Land Class I were foreclosed; 4.2 per cent of loans in Land Class II, 2.7 per cent of loans in Land Class III, 1.2 per cent in Land Class IV, and none of the loans which had been made on Land Class V were foreclosed. By the end of the sixteen-year period the percentage foreclosed in Land Class I had increased to 31.7. With the exception of Land Class V percentage increases in foreclosures in the other land classes also occurred before the end of the sixteen-year period. At the end of the period foreclosures averaged 9 per cent of the total number of mortgage loans made in Land Classes II, III, and IV.

Very recently, the Saskatchewan Land Utilization Board declared certain parcels which had been classified as submarginal on the basis of data obtained in these studies to be submarginal for wheat production under the Saskatchewan Land Utilization Act. This is but one bit of evidence of the fact that results of research are being applied in a practical way.

A report on land classification in fifty-six municipal divisions of south central Saskatchewan has been prepared and is ready for submission for publication.

Land Tenure in Saskatchewan This study which was begun in 1939 was extended to include municipality 129, south of Regina, the Balgonie-Qu'Appelle area east of Regina, the Melfort area in the northeast and the Pleasantdale area south of Melfort. The information secured in these areas in addition to that secured in the Churchbridge-Saltcoats, the Lashburn-Paynton area and the municipality of Pittville No. 169, which were covered in 1939, provides an adequate sample of types of farming and the soils of the province and affords a basis for the development of better working arrangements between landlord and tenant. This is in fact the first comprehensive detailed study of the problems of land tenure in Canada and it is expected that a report will be available during the fiscal year 1942-43.

It must be emphasized that all these projects provide a great deal of economic information which might be made the basis of permanent policies and certainly has value in dealing with current problems of adjustment.

Land Classification in Alberta During the past year, only a small amount of work was done on classification of additional land in Alberta. A report on land classification in the Special Areas was completed and is ready for submission for publication. It may be observed that this report and the one prepared on land classification in Saskatchewan present data relative to the land use in about one-fifth of the area of the wheat belt in the three Prairie Provinces. This information has already been utilized by provincial administrative bodies and by agricultural representatives in the development of their programmes. The Alberta land class maps were used in determining the boundaries of an area recently set aside for military purposes on submarginal land in southeastern Alberta. The Special Areas Board has also made use of these data in determining boundaries of community pastures. Maps showing cultivated and abandoned land have been utilized by the Prairie Farm Assistance Administration. Farmers who desire to exchange submarginal parcels for better land have been guided by the Land Class maps.

The chief activity in Alberta during 1940-41 was a study of irrigation farming as practised in the Canada Land and Irrigation District, the United Irrigation District and

the Taber Irrigation District. In the two former districts, land has not been utilized for the production of intensively cultivated crops to the extent that this has been the case in the Taber District and it was with the expectation that through an analysis of farm operations in all these districts, systems of farm management which result in satisfactory incomes would be thrown into clear relief.

The analysis includes a rather elaborate questionnaire which was completed for eleven irrigation districts now established in the province. This phase of the study reveals that there are 4,379 farmers operating on irrigated land in the province and 507,000 acres are covered by water contracts which means an irrigable acreage of 116 acres per farm. This study when com pleted will also be of value in respect to any settlement programmes which may be contemplated.

It was, however, with another objective that this project was undertaken, namely, to appraise the potentialities of irrigation farming in relation to dry land farming and thus provide a proper perspective regarding land use potentialities in southern Alberta.

The data obtained are being analyzed but it is unlikely because of limitations of staff that a report will be published before 1942 although preliminary releases are planned.

Cattle Ranching Data relating to business operations on more than three hundred cattle ranches were obtained during the summer and fall of 1940. This represents the second year in which this project has been carried on. Reports on the business of individual ranches were mailed to co-operators in June 1940 and a preliminary report was prepared. An article appearing in the December issue of the Canadian Cattleman summarized some of the findings of the survey as revealed by an analysis of records covering one year's business. The analysis of the second year's records was well advanced at the end of the fiscal year. This project is designed to provide information on ranch organization, lease-hold, range management, feeding and marketing problems and is co-ordinated with other studies now being carried forward.

Summary of Economic Surveys

Land classification is now completed in sixty-five municipal divisions in Saskatchewan representing an area of 13,485,821 acres. In Alberta the Special Areas have been classified representing 8,103,577 acres and only the checking of the boundaries remains to be done in five rural municipal divisions in the southwest corner of the Province. This area represents about 1,000,000 acres making a total of over 9 million acres for which the classification has been completed in Alberta. Necessity of a comprehensive study of the economics of irrigation farming comprising of a sample of nearly 600 farms in southern Alberta explains the smaller acreage classified in Alberta.

In Saskatchewan a study of land tenure problems in seven areas is now well advanced toward completion. This study provides an analysis of landlord-tenant relations. An analysis of more than 1200 loans by land classes provides useful information respecting debt carrying capacity of land in the area surveyed in Saskatchewan as well as data which will assist in developing loan policies to meet farmers' requirements. A survey of more than three hundred ranches will provide basic information regarding range policy and ranch practices. This whole program of economic research is designed to provide basic information essential in developing the rehabilitation program.

COMMUNITY PASTURES

The purpose of creating community pastures is to establish controlled grazing on selected areas of submarginal land with a view to removing them permanently from cultivation. Since the start of this work in 1937, community pastures have been brought into operation on 43 areas of submarginal land covering some 887,780 acres. In addition, construction was carried on in 1940 on 11 areas covering 270,400 acres. The 54 pastures, covering 1,158,180 acres, have a total estimated carrying capacity of 35,754 animal units. Three pastures are located in Manitoba and the remaining 51 are located in Saskatchewan. The location of these pastures is shown on Map 2, Page 58 of this Report.

Preliminary to establishing a community pasture, a survey is made of the area to determine land ownership, land use, and the relation of the surrounding farm land. Once control of the land in a proposed pasture is secured, the area is fenced, provided with stockwatering facilities, and regrassed where necessary. When the pasture is ready for use, grazing rights are accorded to stock raisers in the immediate vicinity. Stock raisers using a pasture are formed into a Grazing Association which conducts its business through an elected council of five members. This council decides on the number of stock which each member of the Association may place on the pasture, and co-operates with a pasture manager appointed by the Dominion Department of Agriculture in the operation of the pasture. As the total carrying capacity of each pasture is decided by officials of the Dominion Government, any danger of overgrazing is avoided.

All pastures when completed are created "Game Preserves" and "Pounds" and the pasture manager is appointed as an authorized Game Warden and Poundkeeper.

Ultimately, it is expected that each pasture under the management of the local Grazing Association will become self-supporting, the cost of maintenance and operation being derived from grazing fees. It is further expected that each pasture will become a centre for breeding and marketing one distinctive type of beef cattle. To this end, the P.F.R.A. administration is heading up pastures already established with pure-bred bulls of approved types.

At this point it may be of interest to note the practice used in naming community pastures. In general, a pasture is named from the Rural Municipality in which it is located. Thus the Coalfields pastures are located on two separate areas in the Rural Municipality of Coalfields, Saskatchewan, and are numbered 1 and 2, respectively. The Estevan-Cambria pasture is located partly in each of two municipalities. Where pastures are located in unorganized territory, however, local place names are used, as with the Battle Creek, Nashlyn and Govenlock pastures. The Val Marie pasture is conducted in connection with the P.F.R.A. irrigation project at Val Marie, Sask.

Community Pastures in Operation in 1940-41

In Table 1 are presented data on the area, cost of construction, miles of fence and area regrassed for each of the pastures in operation during 1940. In this table the pastures are grouped by the number of years in which the pastures have been in operation. For the same pastures Table 2 presents data on the estimated carrying capacity, number of animals carried in 1940 and the cost of operation in 1940. These tables, together form a complete statement, but are presented separately for convenience of publication.

DETAILS OF COMMUNITY PASTURES IN OPERATION IN 1940

P.F.R.A.

TABLE 1

Community Pasture	Headquarters of Pasture	Acres in Pasture	Cost of Construction	Miles of Fence	Acres Re-Grassed
	Pastures Operating for Third Year				
Coalfields (2)	Bienfait, Sask.	9,300	13,916.96	30.5	
Estevan-Cambria	Estevan, "	6,880	9,877.46	17.0	
Laurier	Radville, "	24,000	22,485.30	41.0	2376
The Gap (2)	Ceylon, "	11,680	20,644.67	46.0	
Brokenshell, No. 1	Trossachs, "	21,600	18,259.84	41.0)	2309
Brokenshell, No. 2	" "	8,800	10,206.88	23.0)	
Excel (2)	Ormiston "	15,840	17,811.33	44.0	2120
Wreford (2)	Nokomis "	12,320	18,818.12	34.5	
Rudy (2)	Broderick "	14,240	22,843.91	46.0	875
Usborne	Lockwood, "	12,720	16,630.03	29.0	1258
Dundurn	Dundurn, "	20,480	21,363.84	41.0	848
Montrose	Donovan, "	11,680	10,770.34	26.0	330
Mariposa (3)	Kerrobert, "	29,760	30,961.23	65.0	8155
Park	Langham, "	5,840	11,716.94	22.5	
	Pastures Operating for Second Year				
Battle Creek (2)	Vidora, "	67,640	60,784.97	103.5	4500
Nashlyn	Nashlyn, "	62,240	38,710.67	64.5	160
Govenlock	Govenlock, "	44,720	29,022.70	70.0	
Coteau	Birsay, "	26,000	22,175.78	44.5	138
Monet	Hughton, "	31,360	37,230.67	66.0	674
Newcombe (2)	Glidden, "	54,560	68,950.22	112.5	10755
Hillsburgh No. 1	Brock, "	12,640	22,138.58	34.0	1500
Kindersley-Elma	Kindersley,"	22,680	59,849.61	66.5	8026
Oakdale (2)	Coleville, "	20,320	21,650.91	45.0	
Progress (2)	Onward, "	18,720	24,539.83	55.0	1265
Heart's Hill	Cactus Lake"	16,000	16,599.05	36.0	
Battle River-Cutknife (2)	Battleford,"	27,680	44,907.54	88.0	435
	Pastures Operating for First Year				
Lomond (3)	Goodwater, "	54,080	54,129.84	93.0	
Val Marie (2)	Val Marie, "	53,280	55,149.98	81.0	
Beaver Valley	Beaver Valley	11,360	13,026.73	24.0	
Reno No. 1	Robsart, "	16,480)	31,375.44	38.0)	3975
Reno No. 2	Consul, "	10,320)		30.0)	
Key West	Ogema, "	9,920	14,782.85	29.5	80
Auvergne-Wise Creek	Cadillac, "	27,520	34,766.95	59.0	
Elbow	Elbow, "	29,120	32,159.00	67.0	
Archie-Ellice No. 1	Welwyn, "	42,400)	76,047.60	91.0)	7339
Archie-Ellice No. 2	Foxwarren, Man.	20,320)		41.0	
Total Pastures Operated by P.F.R.A.		884,500	1004,305.91	1845.5	57,118
Wallace,	Elkhorn, Man.	3,280	3,051.55	10.0	208
Total All Pastures Operating in 1940		887,780	1007,357.46	1855.5	57,326

OPERATION OF COMMUNITY PASTURES IN 1940

P.F.R.A.

TABLE 2

Community Pasture	Estimated Carrying Capacity	Livestock Carried 1940			Cost of Operation, 1940		
		Cattle	Horses	Sheep	Revenue $	Cost	Surplus (+) or Deficit (-)
Pastures Operating for Third Year							
Coalfields	360	230	115	--	577.76	484.05	+ 93.71
Estevan-Cambria	250	125	165	--	509.79	472.84	+ 36.95
Laurier	1,000	388	165	--	1,344.65	1,015.67	+ 328.98
The Gap	400	512	184	--	1,251.49	1,266.02	- 14.53
Brokenshell, No. 1	720	493	225	--	1,560.17	1,292.40	+ 267.77
Brokenshell, No. 2	300	277	69	--	639.07	538.04	+ 101.03
Excel (and Key West)	860	571	375	--	1,429.04	1,414.88	+ 14.16
Wreford	410	334	215	--	1,019.94	979.58	+ 40.36
Rudy	470	356	209	--	980.50	915.73	+ 64.77
Usborne	700	613	221	--	1,612.17	1,012.22	+ 599.95
Dundurn	650	318	300	--	1,334.95	1,026.41	+ 308.54
Montrose	450	432	62	--	971.95	1,213.20	- 241.25
Mariposa	1,000	635	400	--	2,114.93	1,463.47	+ 651.46
Park	300	213	87	--	551.24	535.64	+ 15.60
Pastures Operating for Second Year							
Battle Creek	2,254	1,278	253	--	2,727.54	1,698.06	+ 1,029.48
Nashlyn	2,000	1,194	228	--	2,789.00	1,927.93	+ 861.07
Govenlock	1,120	973	69	620	1,876.63	1,090.25	+ 786.38
Coteau	650	397	66	--	798.65	651.50	+ 147.15
Monet	1,000	845	346	--	2,207.31	2,188.04	+ 19.27
Newcombe	1,600	361	193	--	947.56	1,091.46	- 143.90
Hillsburgh No. 1	620	336	332	--	1,152.01	967.82	+ 184.19

TABLE 2 (Cont'd)

Community Pasture	Estimated Carrying Capacity	Live Stock Carried 1940			Cost of Operation, 1940		
		Cattle	Horses	Sheep	Revenue	Cost	Surplus (+) or Deficit (-)
Kindersley-Elma	1,000	301	251	--	1,901.46	914.57	+ 986.89
Oakdale	670	385	430	--	1,539.77	980.47	+ 559.30
Progress	470	378	210	26	972.00	858.24	+ 113.76
Heart's Hill	550	401	206	--	1,169.35	850.11	+ 319.24
Battle River-Cutknife	800	527	217	--	1,363.29	1,280.31	+ 82.98
		Pastures Operating for First Year					
Lomond	800	381	279	--	1,120.52	802.69	+ 317.83
Val Marie	1,332	519	96	--	921.48	755.40	+ 166.08
Beaver Valley	378	133	38	--	292.15	470.86	- 178.71
Reno No. 1)	890)	112	167	--	384.71	346.85	+ 37.86
Reno No. 2)	)	202	18	--	343.60	400.68	- 57.08
Key West			Operated with Excel Pasture				
Auvergne-Wise Creek	914	340	120	--	909.07	844.34	+ 64.73
Elbow (Huron)	730	--	43	--	317.75	309.65	+ 8.10
Ellice-Archie No. 1	2,000	870	594	--	2,472.51	2,040.35	+ 432.16
Ellice-Archie No. 2	900	536	204	--	1,347.55	1,191.32	+ 156.23
Total P.F.R.A. Pastures	28,548	15,966	7,152	646	43,451.56	35,291.05	+ 8,160.51
Wallace	150		Operated by the R.M. of Wallace				
Total All Pastures in) Operation in 1940)	28,698						

It will be observed that the Wallace Pasture in Manitoba is treated as a separate unit. This pasture was developed as a P.F.R.A. project, but all responsibility for maintenance and operation has been transferred to the Rural Municipality of Wallace. For this reason, it is necessary to present two groups of totals, one excluding and one including the Wallace Pasture.

From the data presented in Tables 1 and 2, it will be observed that P.F.R.A. community pastures in operation during 1940 represented a grazing enterprise of impressive proportions. Exclusive of the Wallace pasture in Manitoba, the 51 pastures in operation during 1940 covered 884,500 acres, with a capital investment for fences, watering facilities, regrassing, etc., of $1,004,305.91. In this connection it might be pointed out that, in 1939 there were 35 pastures in operation, covering 612,300 acres, with a capital investment of $663,471.25. During 1940, therefore, 19 new pastures were brought into operation. The increase during the year in acreage and capital investment in operating pastures including minor increases in older pastures, has been 272,200 acres and $340,834.66 respectively.

The carrying capacity in 1940 of all pastures in operation, exclusive of the Wallace pasture, was estimated at 28,548 animal units, where one animal unit represents grazing for one cow, one horse or seven sheep for the grazing season. On this basis average carrying capacity was one animal unit per 31 acres of pasture. The corresponding figure in 1939 was one animal unit per 38 acres. This improvement in grazing conditions during 1940 was due partly to better weather conditions and partly to improved range management.

Live stock carried on Community Pastures in 1940, exclusive of the Wallace pasture, comprised 15,966 cattle, 7152 horses and 646 sheep, a total of 23,210 animal units, or 81 per cent of the estimated carrying capacity.

In 1939 the number of animals grazed comprised 7712 cattle, 3710 horses and 500 sheep, or a total of 11,493 animal units, utilizing 72 per cent of the carrying capacity of pastures then in operation.

During 1940, therefore, nearly twice as many animals were grazed on P.F.R.A. community pastures, as in 1939, while the grazing was more intensive.

Revenue from P.F.R.A. community pastures in 1940 amounted to $43,451.56, while expenditures for operation were $35,291.05, leaving a surplus of $8,160.51. The corresponding figures for 1939 were: Receipts $21,632.71; expenditures, $20,945.84; leaving a surplus of $686.87. The relatively better returns in 1940 are largely the result of improvements in pasture management.

Expenditures incurred in the operation of community pastures included pasture managers' salaries, cost of extra labour, vaccines and various sundries.

Revenue from community pastures are derived from grazing fees. Grazing fees during 1940 were as follows:

Schedule of P.F.R.A. Community Pasture Fees

1940-41

		Battle Creek, Nashlyn, Govenlock & Val Marie Pastures	All other Pastures
Grazing Fees per Head			
Cattle	per month	.30	.35
	7 summer months	1.50	1.75
Horses	per month	.40	.50
	7 summer months	1.75	2.50
	5 winter months	1.50	2.00
Sheep	per month	.05	.05
Service			
Breeding fee for cattle		1.00	1.00
Inoculation for Encephalomyelitis		.75	.75
Inoculation for hemorragic septicemia		.07	.07
Inoculation for blackleg		.07	.07

For 1939 the fees per head per month were the same as shown above under "All other Pastures", but no reduced seasonal rates were given. In this regard, therefore, the average fees were lower in 1940 than in 1939.

An important function of community pasture work is to promote improved breeding practices, through the breeding of one selected type of cattle on each pasture. In this connection, some 154 pure-bred bulls were in service during 1940 on the various pastures. These included 83 Herefords, 66 Shorthorns, and 5 Angus bulls. These bulls have been supplied by the Dominion Government, but as the pastures become self-supporting the purchase and upkeep of bulls will become regular operation charges.

Pastures under Construction during 1940-41

Construction of community pastures was in progress during 1940 on 11 areas, covering an aggregate of 270,400 acres. The estimated cost of construction of these pastures is $392,204.00, while the total expenditure to date has been $65,971.84. On the basis of aggregate cost, therefore, construction on these pastures is about one-sixth completed. Construction on the Swift Current-Webb and Paynton pastures is well advanced, while on the remaining pastures little work has been done.

Details of 11 Community Pastures under construction during the fiscal year 1940-41 are presented in Table 3.

COMMUNITY PASTURES UNDER CONSTRUCTION AS OF MARCH 31, 1941

P.F.R.A.

TABLE 3

Community Pasture	Headquarters	Ac. in Pasture	Estimated cost of Construction	Expenditure on Construction to March 31, 1941	Estimated Carrying Capacity	Acres Regrassed	Miles of Fence
Masefield	Masefield, Sask.	29,920	38,214.00	2,553.35	748		46.0
Lone Tree	Bracken, "	28,800	55,631.00	3,721.13	720		49.0
Shamrock	Shamrock, "	24,960	16,480.00	621.00	624		37.5
Swift Current-Webb	Webb, "	15,680	32,510.00	21,268.19	520	5,295	38.0
Big Stick	Maple Creek, "	22,560	31,157.00	3,845.95	564	960	43.5
Spy Hill	Spy Hill, "	20,320	28,363.00	200.00	500.		31.5
Garry	Ituna, "	44,160	46,960.00	6,405.52	1,100		74.0
Hillsburgh-Winslow	Brock, "	15,200	26,918.00	487.80	480		45.0
Elma	Flaxcombe, "	21,440	40,733.00	3,929.83	500		42.0
Milton	Marengo, "	26,400	42,868.00	1,410.00	600		49.0
Paynton	Paynton, "	20,960	32,370.00	21,529.07	700		46.5
TOTAL		270,400	392,204.00	65,971.84	7,056	6,255	502.0

Regrassing on Community Pastures

On many of the community pastures some areas have been cultivated and subsequently abandoned to weeds while other areas have been overgrazed. This condition, aggravated by drought, had greatly reduced the amount and quality of grass available for grazing animals. As a remedial measure, seeding of grasses on such areas has been undertaken on a large scale. During the four years 1937 to 1940, inclusive, a total of 63,581 acres of land on 23 community pastures have been seeded down. Of this acreage 5,223 acres were seeded in 1940. The regrassed area on different pastures is shown for pastures in operation in Table 1, and for pastures under construction in Table 3.

The principal grass used for seeding on community pastures has been crested wheat grass, but brome and sweet clover have been used where conditions might warrant. Actual seeding operations have been conducted by the Dominion Experimental Farms at Brandon, Manitoba, Indian Head, Saskatchewan, Swift Current, Saskatchewan, and Scott, Saskatchewan.

The average cost of regrassing on community pastures, for the four-year period, has been $1.07 per acre, this cost covering both seed and labour.

Harvesting Crested Wheat Grass Seed During 1940 the right to harvest some 2,500 acres of crested wheat grass on three community pastures was sold for the sum of $1,100.00. A much larger acreage, possibly 10,000 acres, will likely be harvested in 1941. As much as possible of this future crop will be harvested in the interest of the P.F.R.A. Office, to enable still further seeding on Community Pastures and other submarginal lands under government control. A crop estimated at one-half million pounds of crested wheat grass seed is anticipated.

Distribution of Crested Wheat Grass Seed to Rural Municipalities In connection with the program of regrassing submarginal lands, provision has been made to supply seed of crested wheat grass to rural municipalities for the purpose of establishing large community seed plots. Subject to limitations of supply, sufficient seed will be supplied free to interested municipalities to seed down a maximum of 640 acres of land, the resulting grass to be used solely for seed production. On a conservative estimate, the seed from 640 acres of crested wheat grass should supply, fully, in the course of a few years, the requirements of an average rural municipality for regrassing road allowances and vacant public lands.

Construction of Fences on Community Pastures

Since 1937 some 1900 miles of fence have been erected on community pastures, while sufficient new fencing is in progress to bring the total length of fence up to 2357.5 miles. This fencing consists of four or five strands of barbed wire attached to tarred cedar or creosote-treated pine posts. Each fence is built in 80-rod sections so that any break in the fence with loss in wire tension will be localized. In view of the long term nature of this work, strong fences are necessary.

Water Development on Community Pastures In the management of range land it is desirable that water supplies be distributed so cattle will not have to travel more than one and one half miles to a watering place. In an effort to secure this condition on P.F.R.A. pastures new stockwatering

facilities, including dams, dugouts, wells and so forth, have been provided at several hundred locations. There still remains much water development work to be done, but facilities provided to date are sufficient for immediate needs.

Future Development of Community Pastures In addition to the 54 pastures already constructed or under construction, consideration has been given to the development of extensive submarginal areas in Saskatchewan and Manitoba. While no P.F.R.A. community pastures have been established in Alberta, considerable assistance has been given to that Province in the development of range land in the territory administered by the Special Areas Board of Alberta. These Special Areas, covering over eight million acres of land unsuited for ordinary farming constitute a provincially operated counterpart of community pastures in Saskatchewan.

LAND SETTLEMENT

In connection with several phases of the P.F.R.A. program, efforts are being made to enable farmers located on submarginal areas to resettle on better class land. This work is largely related to community pastures and water development.

Movement of Settlers from Community Pastures The establishment to date of 54 community pastures has involved the transfer of 149 settlers to better class land. Not only has this work benefited the settlers concerned, but it has simplified pasture construction work by eliminating considerable expensive fence construction.

Development and Settlement of P.F.R.A. Irrigation Projects

Under the Water Development Branch of the Prairie Farm Rehabilitation Administration, a number of large community irrigation projects have been constructed or are being constructed at various points throughout the drought area. Details of these projects will be found under "Water Development" on Pages 22 to 34 of this report.

Settlement of these projects is a phase of Land Utilization work. Actual agricultural development of large irrigation projects, involving the ditching, levelling, seeding and initial distribution of water, preparatory to allotting the land to settlers, has been undertaken by the Experimental Farms Service. The progress of agricultural development and the settlement of large irrigation projects is outlined below.

Val Marie Irrigation Project This project provides for the irrigation of 6049 acres of river bottom flats near the village of Val Marie by means of a 3600-foot dam across the Frenchman River, constructed in 1936, with a storage capacity of some 6000 acre-feet of water. Agricultural development of this project began in 1937, and during 1938 crops were produced on 3625 acres of the irrigated land. In 1939 settlement of part of theforegoing acreage was started by the Land Utilization Branch, while an additional 2000 acres were prepared for irrigation.

During 1940 the Experimental Station continued cropping operations on land not yet settled on the Val Marie Project. Altogether some 350 acres were sown to cereal crops, largely for good seed propagation, and 806 acres were sown to forage crops. During the summer a heavy infestation of beet web

worms attacked the forage crops, completely destroying the stand on about 560 acres. Late in the fall 286 acres of the devastated area were reseeded to the same forage crops. This incident illustrates one type of hazard encountered in prairie agriculture.

The active settlement of the Val Marie Project was undertaken in the spring of 1939. One-year leases and lease options only were granted in order to secure the settlement by farmers competent to operate under irrigation conditions. Eventually, sale agreements will be offered to suitable settlers. By the end of 1939 a total of 3,234 acres, including 2487 acres of irrigable land had been leased to 23 settlers. The land was leased at the rate of 50 cents per acre plus a charge of $1.50 per acre for irrigation water. During 1940 agreements of sale were entered into with seven original residents of the area, each agreement covering approximately 80 acres of irrigable land. Additional land was also leased to the same residents. The price of irrigable land in this project varies from $7.50 to $15.00 per acre, according to productive capacity. A minimum payment of $1.00 per acre per annum must be made, unpaid balances to bear interest at five per cent. Non-irrigable land in the projects is sold at $1.00 per acre. Where land is leased the rental is 50 cents per acre per annum. Water for irrigation purposes is supplied to lessees and purchasers at an annual rate of $1.50 per acre of irrigated land.

Considerable difficulty has been experienced in finding settlers with satisfactory irrigation training to place on these lands.

Settlers on the Val Marie and West Val Marie (see below) projects have access to grazing in the Val Marie Community Pasture.

West Val Marie Irrigation Project This project, located on the Frenchman River a few miles above Val Marie, provides for the irrigation of 4146 acres of land. Construction of irrigation works was commenced in 1939, and was still in progress in 1940.

Preparation of land for irrigation in this project was commenced in 1938 and by 1940 some 2360 acres were under cultivation, including 1280 acres in cereal crops and 1110 acres in summerfallow. This land is not yet irrigated, the object of the cultivation being to prevent weeds from infesting the levelled land pending completion of the irrigation works.

No settlement has yet taken place on this project.

Eastend Irrigation Project Located on the Frenchman River near the town of Eastend, this project provides for the irrigation of 3200 acres of river flats. The storage capacity of the Eastend dam is only about 1300 acre-feet, but the reservoir can be replenished as desired from the Cypress Lake reservoir of 70,000 acre-feet capacity. During 1940 some 3108 acres of land in this project were under irrigated crop, 1503 acres being on land leased to settlers, 975 acres on land owned by settlers and 630 acres still under P.F.R.A. control, some of which is available for settlement. Unfortunately, crops on this project were largely destroyed in 1940 by grasshoppers.

Maple Creek Irrigation Project The Maple Creek Irrigation project provides for the irrigation of river flats along Maple Creek in Saskatchewan. Maple Creek with Gap Creek and other tributaries, drains part of the northern slope of

the Cypress Hills, south of the town of Maple Creek, and empties into Bigstick Lake, about 30 miles northeast of Maple Creek. There are approximately 15,000 acres of irrigable river flats in the Maple Creek system, much of which has been subject to more or less haphazard irrigation by ranchers. Under the P.F.R.A. it is proposed to provide reservoirs and canals for a more dependable production under irrigation of reserve supplies of hay and feed, in order to stabilize the large ranching industry in the Maple Creek District.

The irrigation works along the Maple Creek stream system consist of several reservoirs, diversion dams, dykes and canals.

Four reservoirs have been constructed. The Downie Lake reservoir, of 10,000 acre-feet capacity was constructed in 1938 near the headwaters of Gap and Downie Creeks. Water from this reservoir is conveyed by Gap Creek to Maple Creek, or may be diverted to irrigable land near the town of Maple Creek. The Junction reservoir of 10,000 acre-feet capacity at the junction of Gap and Maple Creeks was constructed in 1939. Smaller reservoirs have been constructed further down stream at Tenaille Lake (2500 acre-feet) and at Lee Lake (250 acre-feet). The function of these reservoirs is to retain spring run-off for midsummer irrigation.

Preparation of land for irrigated crop production in the Maple Creek project was started in 1938, most of the land being broken from native sod. In 1940 irrigated crops, consisting largely of certified or registered cereals, were grown on 3000 acres in this project. Yields were good, that of oats being in one area as high as 125 bushels per acre. A large proportion of this grain will serve to improve the quality of cereal crops grown in the district.

During 1940 a trial crop of potatoes were grown under irrigation on a 20-acre field of the Maple Creek project. A total of 135 tons of potatoes were harvested, or 6.75 tons (225bushels) per acre.

A definite land settlement policy has not yet been outlined for the Maple Creek project, but it is anticipated that such a policy will be developed during 1941.

PROGRESS OF WATER DEVELOPMENT UNDER THE P.F.R.A. PROGRAM

The development of water for agricultural use is a major activity under the Rehabilitation program, and one which has already resulted in substantial benefits to farmers and ranchers in the drought area. The object of this work is to provide for the storage by means of dugouts or dams, of spring run-off water for domestic and stockwatering uses and for irrigation purposes where sufficient water is available in districts where the normal summer supply is inadequate for the best utilization of crop or grazing land.

Surface Water Resources of the Prairie Provinces in Relation to Agriculture

Drought is the main factor affecting agriculture in the open plains. This condition limits crop production in much of the settled area to the relatively drought-resistant cereals and grasses, wheat growing and ranching being the major enterprises. In some districts, notably southwestern Saskatchewan and southeastern Alberta, the average precipi-

tation is too light for crop production purposes. Fluctuations in amount and territorial distribution of annual precipitation resulting in occasional droughts of varying intensity and extent, present an additional factor which vitally affects the agricultural economy of the prairies. Still another factor, arising from climatic conditions, is the scarcity of surface water supplies which adversely affects the use of land for livestock production.

Aside from tillage and cropping practices which aim at the most economical use of soil moisture for crop use as referred to in the cultural section of this Report, the chief method of overcoming the handicaps imposed on agriculture by low precipitation is the utilization of run-off water from melting snow and occasional heavy rainfalls, either for irrigation or stockwatering or both.

Nature of Water Development under the P.F.R.A.

The main objective of the P.F.R.A. water development program is to utilize available surface water resources in a manner which will result in the greatest benefit to dry land agriculture, rather than to establish a more or less self-contained system of irrigated farming. With this objective in mind, the following types of projects are being developed.

1. Small Projects Financial and engineering assistance is provided to assist individual farmers to construct dugouts and small dams for stockwatering and domestic use, and small irrigation projects for the production of forage. Prior to the recent drought period the value of such projects was not fully realized by farmers and during the drought period the capacity of farmers for construction work has been seriously impaired by adverse economic conditions.

2. Large Projects Community projects which are beyond the range of individual enterprise are being constructed under the P.F.R.A. at many points throughout the drought area. These include irrigation works and storage reservoirs. In some cases existing large irrigation projects are repaired with a view to maintaining continued operation for the benefit of settlers, or even enlarged to provide locations for settlers moved from submarginal lands. Suitability of land for irrigation and economy of construction per acre of irrigable land are guiding factors in this work.

Progress made in construction, as well as the terms under which work is conducted is outlined below under the separate headings of "Small Projects" and "Large Projects".

SMALL WATER DEVELOPMENT PROJECTS

The conservation of surface run-off water by means of small projects including dugouts and dams, is an important activity in the Prairie Farm Rehabilitation program and particularly in that phase devoted primarily to the rehabilitation of individual farmers. Engineering and financial assistance are provided on a self-help basis to individual farmers and ranchers in developing water supplies for their individual use. This phase of P.F.R.A. has from the outset attracted wide-spread attention as indicated by the increasing numbers of applications received for the assistance provided. This type of work is by no means new on the prairies since some of the very early ranchers in the foothill country of the southwest and Cypress Hills area found it necessary to develop small irrigation projects to grow feed during periods

of low rainfall while the dugout as a means of conserving run-off water for domestic purposes has been used since the early days by settlers in both Manitoba and Southeastern Saskatchewan. The Prairie Farm Rehabilitation Act Water Development program has, however, served to awaken general interest in the possibilities of conserving surface run-off water that is otherwise going to waste on many farms throughout the low rainfall area.

Assistance is provided for three types of projects, namely, dugouts, stockwatering dams, and irrigation. In addition to individual projects, engineering service and financial assistance may be recommended for community projects on the basis of cost up to some previously authorized amount based on the engineer's estimate.

Rates of Assistance

The rates of assistance in effect during the fiscal year were as follows:

Projects for Individual Use

(a) Dugouts 4½¢ per cubic yard for earth excavated up to a maximum of $125.00.

(b) Stockwatering Dams 4½¢ per cubic yard for earth excavated and 25¢ per cubic yard for rock work plus cost of materials purchased up to a maximum of $150 including earth, rock and materials.

(c) Irrigation Projects 4½¢ per cubic yard for earth excavated and 25¢ per cubic yard for rock work plus cost of materials purchased up to a maximum of $350 including earth, rock and materials.

(d) Repairs Financial assistance for repairs of small projects may be recommended where a project may require repairs as a result of flood damage where such damage occurs within one year after the project is completed, on the basis of 4½¢ per cubic yard for earth and 25¢ per cubic yard for rock work and cost of materials up to a maximum not to exceed 50 per cent of the total financial assistance previously paid from P.F.R.A. Consideration may be given to extending the one-year period where there is evidence that a project has not been filled to capacity within one year after completion owing to limited run-off.

(e) Enlargements Financial assistance may be recommended for enlargement of small projects where it is found advisable to increase the capacity or ensure greater safety, on the basis of assistance outlined above provided the maximum including all previous payments does not exceed $125 for a dugout or stockwatering dam, $350 for an individual irrigation project and $500 for a neighbour project.

Neighbour Projects

Where two or more individuals may find it to their advantage to pool their water resources, financial assistance may be provided on the same unit basis as for an individual project but up to a maximum of $500, including earth, rock and material.

Small Community and Municipal Projects

Community projects, when applied for by municipalities or other legally organized bodies such as Water Users' Associations, may be given financial assistance on the basis of cost upon authorization by the Minister of Agriculture. Where such applications are approved, the municipality or organization assumes responsibility for the construction of the project and for the maintenance and operation when completed. The applicant is also required to obtain control of the necessary right-of-way to make the project available to the community.

All dams, both stockwatering and irrigation, must be authorized by the Provincial Water Rights Office of the province in which the project is located, and the work done must pass engineering inspection before payment of any financial assistance can be recommended. Engineering and agricultural services are provided without charge to the extent that staff is available.

Progress in the Construction of Small Water Development Projects

The number of applications received for various types of small neighbour and community projects, and the corresponding number of projects constructed as of March 31, 1941, is presented in Table 4 for each Prairie Province.

From the inauguration of the P.F.R.A. program in 1935 to March 31, 1941, a total of 32,896 applications for assistance in the construction of small neighbour and community projects has been received. Of these applications some 20,040 have been approved for construction and 15,646 projects have been constructed. The projects which have been constructed include 10,885 dugouts, 3,829 stockwatering dams and 932 irrigation projects.

The total estimated cost of the foregoing projects is $2,190,918. For the small projects the average financial assistance has been about $80.00 for a dugout, $75.00 for a stockwatering dam and $150.00 for an irrigation project. The corresponding assistance for neighbour projects has amounted on the average to $175.00 for a dugout, $245.00 for a stockwatering dam and $400.00 for an irrigation project. These figures are approximate only, since the actual amount of assistance provided for a project cannot always be determined until some time after completion of the work. In community projects, the full cost of which is usually defrayed from P.F.R.A. sources, the cost per project has ranged from $100 to $5,000, with an average of about $800.00.

Of 15,646 water development projects completed during the six-year period ending March 31, 1941, 15,246 were individual projects, 67 neighbour projects and 33 were community projects. Of the individual projects 10,673 were dugouts, 3668 stockwatering dams and 905 were irrigation projects. Neighbour projects included 34 dugouts, 20 stockwatering dams and 13 irrigation projects. Community projects included 178 dugouts, 141 stockwatering dams and 14 irrigation projects.

Projects completed during 1940-41 numbered 1,424, including 1374 individual projects, 17 neighbour projects and 33 community projects.

SMALL WATER DEVELOPMENT PROJECTS

From inauguration of program to March 31, 1941.

TABLE 4

Type of Project and Province	Applications Received				Projects Completed			
	Dugouts	Stockwatering Dams	Irrigation Projects	Total	Dugouts	Stockwatering Dams	Irrigation Projects	Total
Individual								
Manitoba	6,495	499	45	7,039	4,653	261	15	4,929
Saskatchewan	13,326	5,319	1,844	20,489	5,445	2,590	615	8,650
Alberta	1,380	2,105	1,140	4,625	575	817	275	1,667
TOTAL	21,201	7,923	3,029	32,153	10,673	3,668	905	15,246
Neighbour								
Manitoba	32	15	4	51	29	11	4	44
Saskatchewan	15	18	11	44	5	9	8	22
Alberta	0	2	5	7	0	0	1	1
TOTAL	47	35	20	102	34	20	13	67
Community								
Manitoba	1	35	0	36	0	12	0	12
Saskatchewan	273	231	16	520	173	90	2	265
Alberta	11	47	27	85	5	39	12	56
TOTAL	285	313	43	641	178	141	14	333
GRAND TOTAL	21,533	8,271	3,092	32,896	10,885	3,829	932	15,646

Survey of Completed Small Projects

For the purpose of securing information on the extent to which small P.F.R.A. water development projects were being utilized, inspections were made during 1940 of several hundred completed projects. In the main, this survey covered dugouts and stockwatering dams, selected at random throughout the P.F.R.A. area, and may be considered as a representative cross-section of general conditions.

Over 75 per cent of the dugouts inspected were filled to capacity in the spring of 1940, despite a light run-off, while less than two per cent were in an unsatisfactory condition. On over 80 per cent of the farms served by dugouts, the one-time troublesome task of hauling water had been eliminated. The average dugout, when full, held sufficient water supplies for one year's use.

Over 34 per cent of the dugouts inspected were being used for domestic purposes, 93 per cent for stockwatering, 19 per cent for cutting ice and nearly 20 per cent supplied water for garden irrigation. On 29.4 per cent of the farms served by dugouts there had been an increase in the numbers of live stock carried. An appreciable number of dugouts had been improved by levelling and grassing the excavated banks, planting trees and enclosed by fences. Similar conditions were found on stockwatering dams.

LARGE WATER DEVELOPMENT PROJECTS

Large water development projects as distinguished from smaller or individual systems, consist of all those projects which have been fully constructed and paid for from the P.F.R.A. vote. They consist of large stockwatering dams, irrigation and water supply projects, ranging in cost from a few hundred to as much as three or four hundred thousand dollars.

The magnitude of this phase of the P.F.R.A. program may be indicated by the fact that the 71 large water development projects completed or under development by March 31, 1941, represent a total water storage capacity of more than 300,000 acre feet, and the development of new irrigation facilities serving over 100,000 acres of irrigable land. The total cost of these large projects, completed and under construction, is in the neighbourhood of $2,800,000.00. Exact figures will not be available until certain projects are completed. Inasmuch as the bulk of this work is developed with a view to livestock production, its value for the improvement of prairie agriculture, especially under existing conditions of partial stagnation in the overseas grain trade, must be fairly obvious.

In connection with all of these projects, it is necessary to carry out comprehensive field investigations consisting of topographical and soil surveys as well as tests to determine foundation conditions for the necessary structures. After the structures have been completed certain maintenance is necessary consisting of repairing and strengthening the works where any weakness or damage has developed after the works have been put to the test of conserving and delivering water during the following spring.

In this Report it is proposed to discuss the various projects which have been dealt with during the year under the following headings:

1. Field Investigations.
2. Construction.
3. Maintenance.

In Table 5 of this report, beginning on page 26 are lists of projects giving the name and location, and indicating cost of construction. The more important projects are discussed in some detail in the body of the Report. The locations of the larger projects are indicated on Map 3, page 59.

Field Investigations

These investigations consist of surveys, varying in nature from the reconnaissance type to detailed surveys involving topographical and soil studies of large areas. Designs and cost estimates for construction purposes cannot be completed without this detailed field information.

Manitoba

In the province of Manitoba, the projects investigated consist mainly of storage sites for stockwatering purposes. There are a number of streams in the province which have a considerable flow in the spring but dry up or get very low later in the year. The purpose of the projects investigated in Manitoba is to store this spring run-off in artificial or natural lakes to be released as required to maintain stream flow principally for stockwatering purposes, but in some cases for irrigation. In Manitoba, the Souris River is of considerable importance. This stream flows into the province from the United States, where there are a number of large dams which prevent much of the water reaching Manitoba. Conservation of the limited supply available for stockwatering purposes is of considerable importance to the southern part of the province. A number of control structures along the Souris have already been completed, locations for others have been surveyed.

During 1940 a comprehensive investigation in Manitoba was completed to determine the water resources of the P.F.R.A. area. This investigation indicates that, while irrigation on an extensive scale will never be practical in Manitoba, mainly because of inadequate water supplies, a large number of small irrigation projects, and possibly a few large ones, might be developed.

The fact that there is at present practically no irrigation within the P.F.R.A. area of Manitoba arises more from lack of knowledge of the practice and benefits of irrigation than from any evidence that irrigation would not be beneficial.

Saskatchewan

It is in the province of Saskatchewan that the ravages of drought have been most widespread and devastating, and naturally a great many developments consisting of domestic and stockwatering supplies, irrigation and other projects have been investigated. From Table 4 it will be noted that 90 community dams have been constructed in the province. These consist of earth filled dams of moderate height (possibly from 10 to 15 feet) well distributed throughout the various municipalities to serve the greatest number of people for stockwatering and domestic purposes. In many cases small areas below the dams are irrigable and will be used by the municipalities to grow a reserve supply of feed.

The remainder of the projects are much larger, consisting of facilities to irrigate as much as 20,000 to 30,000 acres in a block. Before constructing such projects as these, very comprehensive and detailed surveys are required. In

addition to the projects already built many others have been surveyed in sufficient detail to permit their immediate construction.

During 1940 surveys were made along the valley of the Qu'Appelle River for the purpose of determining irrigable lands and reservoir sites. Plans and estimates were completed for a number of storage projects for future construction.

Alberta

The most reliable and largest water supply in the drought area flows eastward from the mountains and consists of ten large streams, all of which can be diverted by gravity in Alberta and used to irrigate large tracts of land.

In this respect Alberta is most favourably situated; there are a number of very large projects in that province which may be constructed, in addition to those already in operation. Some of these have been investigated during the year. It will be necessary, however, to continue the investigations during 1941 in order to determine the feasibility of constructing these projects.

The Lethbridge Southeast project is an extension of the existing irrigation facilities now in operation from the St. Mary River to irrigate a large tract of land to the south and east of the city of Lethbridge. It is proposed to extend the existing facilities first to the west in order to pick up additional water from the Waterton and Belly Rivers and then to the east to include some 300,000 acres of additional land to the south and east of Lethbridge in the large tract of land between the Belly and Milk Rivers as far as Pakowki Lake. The original surveys of this project were made some years ago. Certain changes in conditions since that time have made it necessary to carry out some additional investigations.

The North Saskatchewan River project consists of the diversion of the Clearwater and Red Deer Rivers to Buffalo and Sullivan Lakes and the extension of canals from these lakes to large tracts of land, both in Alberta and Saskatchewan, distributed all the way from Hanna in Alberta to Saskatoon in Saskatchewan.

Water from the Red Deer cannot be diverted by gravity because of the height of the river's banks. The proposed system would entail a high dam across the river below the outlet to Buffalo Lake and power and pumping units on the river. By using cheap power provided by the Bow River units the pumps could be used for irrigation purposes, and the power units on the Red Deer would be able to make up for what was used when the load on the Bow became too heavy. The water pumped out of the Red Deer would flow by gravity to Sullivan Lake, and thence to irrigable lands. The original surveys were made of this project some years ago by the Dominion Reclamation Service. Further surveys are required in order to determine the feasibility of the project.

Investigation was also completed of a proposal of the Canada Land and Irrigation Company to make approximately 15,000 acres of land at the eastern end of their holdings near Vauxhall, available for resettlement purposes.

During 1940 surveys were made for the extension of canals from the Leavitt Irrigation District, which now serves the area between the village of Leavitt and the town of Cardston to the land south of Cardston in the Aetna district.

A number of smaller community projects in Alberta were also investigated

Construction

Construction work was conducted in 1940-41 at a cost of $505,887.42, on the following 13 large water development projects:

West Val Marie Irrigation Project, Saskatchewan.

Maple Creek Irrigation Project, Saskatchewan.

Arcola Storage Project, Saskatchewan.

South Saskatchewan River Project (Saskatoon Dam) Sask.

Qu'Appelle River Development, Saskatchewan.

Caron Water Storage, Saskatchewan.

La Fleche Storage Project, Saskatchewan.

Weyburn Storage Project, Saskatchewan.

Rolling Hills Irrigation Project, Alberta.

Bullshead Creek Storage Project, Alberta.

Wawanesa Storage Project, Manitoba.

Rock Lake, Morris River and LaSalle River Storage Projects, Manitoba.

Brandon Dam, Manitoba.

Particulars of the above projects are contained in Table 5, beginning on page 26 of this Report.

Maintenance

In order to justify the construction of many of the small projects which serve very useful purposes in communities where it is difficult to get water from wells, it is considered good engineering to take some chance on an occasional washout rather than design permanent or flood-proof structures, the cost of which would be prohibitive. It is therefore necessary to foresee and provide for any necessary repairs, enlargements and improvements to such structures. Until an earth dam has taken its final settlement it is extravagant to completely protect the face from wave action, so that in the case of all earthfill dams, additional protection is required from time to time during the first few years of operation.

Unforeseen and unprecedented floods during the spring when the works are new and untried will sometimes cause damage to structures. Contingencies such as this must be provided for. In the case of small dams, particularly those turned over to municipalities, there is sometimes a lack of understanding and supervision during periods of high flow which result, particularly in the first few years, in damage to structures. Until an efficient organization is set up to operate these structures, damage will result. This must be recognized and provided for.

During the fiscal year 1940-41 the sum of $40,042.30 was expended in making repairs to a number of large projects which had been previously constructed under the P.F.R.A.

LARGE WATER DEVELOPMENT PROJECTS COMPLETED OR UNDER CONSTRUCTION IN MANITOBA, MARCH 31, 1941.

TABLE 5

Project	Location	Description of Project	Irrigable area (acres)	Storage Capacity ac. ft.	Cost of Construction & Land Purchase
Souris Dam	Souris, Man.	Reconstruction of old dam built in 1911 on Souris River for stockwatering and domestic purposes. Completed in 1935.	-	150	$ 3,841.00
Melita Dam No. 1 Melita Dam No. 2	8-4-26-1 33-2-27-1	Concrete stockwatering dams on the Souris River constructed in 1937.	-	780 480	11,227.44
Napinka Dam	8-5-25-1	Stockwatering dam on Souris River		1000	6,709.55
Crystal City Dam	24-2-12-1	Stockwatering dam on tributary to Pembina River. Completed in 1935.	-	3	3,334.21
Clearwater Dam	17-2-12-1	Rock filled timber crib dam on tributary to Pembina River for stockwatering. Completed 1938.	-	12	5,948.70
R.M. of Edward 4 dams	14-1-28-1 3-2-28-1 3-2-29-1 8-4-28-1	Stockwatering dam on Antler Creek. Compl'd 1935. Stockwatering dam on Gainsborough Cr. " 1935 Stockwatering dam on Gainsborough Cr. " 1935 Stockwatering dam on Graham Creek " 1935	-	100	10,214.03
Carberry Pasture	Carberry,	Development in 1937 of wells and springs for S.W.	-	-	2,180.00
Wawanesa-Souris	26-7-17-1	Stockwatering dam completed in 1940.	-	320	15,457.25
Rock Lake, Morris River & LaSalle River storage projects.	Various	Stockwatering dams at various locations under construction in 1940.			17,016.00
Brandon Dam	Brandon	Concrete weir across Assiniboine River at Brandon. Improves water supply for City of Brandon and provides stockwatering and domestic supplies to farms below the dam. Constructed by the Province of Manitoba with assistance to extent of $3,996.45 from P.F.R.A.	-	-	3,996.45

LARGE WATER DEVELOPMENT PROJECTS COMPLETED OR UNDER CONSTRUCTION IN SASKATCHEWAN, MARCH 31, 1941

Project	Location	Description of Project	Irrigable area (acres)	Storage Capacity ac. ft.	Cost of construction and land purchase
Cypress Lake Storage	Tp.6, Rges 25, 26 & 27	Construction of dams at east and west ends of Cypress Lake to raise level of water about 14 feet. The reservoir so formed will provide water for irrigation and stockwatering along the Frenchman River, Battle Creek and other streams. Projects dependent on or benefited by the Cypress Lake development include Val Marie, Val Marie West, Eastend, Eastend Extension and Robsart-Vidora, details of which are presented below:		70,000	$378,325.54
Val Marie Irrigation Project	15 & 22-4-14-3	Storage dam on Frenchman River for irrigation of river bottom flats. Completed in 1937. In operation during 1938.	6049	6,000	213,175.70
West Val Marie Dam	12-5-15-3	Dam and Spillway for irrigation project above Val Marie project on Frenchman River. Dependent on Cypress Lake Development. Completed 1939.		2,000	57,106.90 (for dam and spillway only)
West Val Marie Irrigation	12-5-15-3	Preparation of land for irrigation. In progress.	3416	--	23,136.97
Eastend Irrigation Project	25-6-22-3	Storage dam and canals for irrigation of river flats on Frenchman River. Completed in 1936. In operation 1938. Dependent on Cypress Lake development.	2500	1,300	112,475.03
Eastend Extension	Tp.6-21-3	Extension of canals from Eastend project (above). Dependent on Cypress Lake Development. Completed 1939.	2896	Cypress Lake	45,401.11
Robsart-Vidora	Tp.4 & 5 Rges.26 & 27, W3	Canal and ditches from Cypress Lake for land south of lake. Started in 1938. Cost to date included in Cypress Lake cost	3000	Cypress Lake	

SASKATCHEWAN (continued)

Project	Location	Description of Project	Irrigable area (acres)	Storage Capacity ac. ft.	Cost of construction and land purchase
Adams Lake	14-8-29-3	Storage dam on Battle Creek for stockwatering and irrigation. Completed in 1937.	1500	2,000	8,831.07
Middle Creek	21-4-30-3	Storage dam on Middle Creek for stockwatering and irrigation. Completed in 1937.	1000	20,000	17,911.13
Coderre Dam	36-13-3-3	Timber crib weir on Wood River, constructed in 1936. Stores stockwater for 18 miles.	--	773	7,729.82
Wood River Storage	9-13-4-3 8-9-5-3 31-8-5-3 22-7-6-3 18-6-6-3 30-5-6-3	Rock and timber weirs to store water in Wood River for stockwatering	--	4,000	20,040.70
Souris-Estevan Irrigation System: Includes Roughbark Creek, Dead Lake and Estevan Projects					
Roughbark Creek Dam	29-6-13-2	Storage dam on Roughbark Creek, tributary to Souris River. Supplementary to Dead Lake Project (below) Completed in 1937.		1,500	9,314.93
Dead Lake Storage	8-4-11-2	Storage dam on Souris River for irrigation of river flats above Estevan. Completed in 1937.	3900	2,600	14,615.98
Souris-Estevan		Canals, dykes and control structures to flood irrigate some 3900 acres along Souris River. Sources of supply, Roughbark and Dead Lake dams (above). Completed in 1939.	(see Dead Lake)	--	91,012.73

SASKATCHEWAN (continued)

Project	Location	Description of Project	Irrigable area (acres)	Storage Capacity ac. ft.	Cost of construction and land purchase
Weyburn Storage	Weyburn, Sask.	Diversion by canal of water from Souris River to underground water supply for City of Weyburn. Completed in 1937.			6,603.45
Weyburn Dam	Weyburn, Sask.	Dam across Souris River to provide water supply for Weyburn. Completed in 1940.		4,430	25,950.25
Souris-Oxbow	14-3-2-2	Timber and rock filled dam across Souris River just below town of Oxbow. Storage for stockwatering. Completed in 1938.		600	17,436.15
Long Creek Dams		Rock filled timber crib dams on Long Creek, tributary to Souris River. Completed in 1936. For Stockwatering			
No. 1	10-2-8-2			138	8,729.62
No. 2	13-1-8-2			90	8,701.46
	Kisbey Irrigation: Includes Moose Mountain Lake and Kisbey Projects				
Moose Mountain Lake	9-11-8-2	Earth filled dam across Moose Mountain Creek near Kisbey. Completed in 1937.	(see Kisbey below)	8,000	14,604.25
Kisbey Flats	Tp.8-5-2	Irrigation works to utilize storage from Moose Mountain Lake.	2300		22,978.40
Wascana Creek Reclamation	Near Lajord, Sask.	Reclamation of 13,000 acres of spring flooded land by straightening parts of Wascana Creek. Completed in 1936.	--	--	13,800.00
Davidson Dam	27-26-29-2	Stockwater and irrigation storage. Completed in 1937.	100	277	3,113.67
irvin Dam	21-25-8-2	Stockwatering dam completed in 1937		19	2,180.13
aston Dam	32-29-28-2	Stockwatering dam completed in 1937		350	1,896.28

SASKATCHEWAN (continued)

Project	Location	Description of Project	Irrigable area (acres)	Storage Capacity ac. ft.	Cost of construction and land purchase
Big Arm Dam	30-25-25-2	Dam to store water in arm of Last Mountain Lake for irrigation of adjacent lands by pumping. Completed in 1938.	5000 to 8000	5,200	13,060.66
Moose Jaw Creek Flood Irrigation	Tp.10, Rges. 18 & 17-2	Earth fill dam to provide for flood irrigation and stockwatering in valley of Moose Jaw Creek. Completed in 1938.	2250	2,180	7,517.77
Caron Water Storage	Tp.17-29-2	The object of this project is to provide water for stockwatering and irrigation along Thunder Creek and to augment the supply of municipal water in the City of Moose Jaw. Water will be pumped through a pipe line from the South Saskatchewan River at 18-21-7-2 to a height of 335 feet at the nearby height of land in 16-21-7-2 where a storage reservoir will be provided. From this point the water will flow by gravity along Thunder Creek to Caron in 17-29-2 where additional storage facilities will be provided. Completed 1940.		43,500	571,954.44
Lac Pelletier	24-12-15-3	Stockwatering dam near Swift Current. Completed in 1937. Benefits Swift Current municipal supply.		3,350	2,139.08
Lake of the Rivers	4-8-29-2	Earthfill dam for stockwater storage. Completed in 1938.		300	10,805.14
Pipestone Lake	6-15-3-2	Earthfill dam at east outlet of Pipestone Lake for stockwatering storage.Completed in 1938.		1,600	10,808.44
Masefield Dam	16-2-14-3	Earthfill dam for stockwater storage. Completed in 1938.		40	3,187.23

SASKATCHEWAN (continued)

Project	Location	Description of Project	Irrigable area (acres)	Storage Capacity ac. ft.	Cost of construction and land purchase
Arcola Water Storage	26-8-4-2	Improvements to existing supply for Town of Arcola and farmers adjacent to pipe line.			17,310.00
Dunn & Watt Storage. McEachern, Sask.	11-1-8-3	Flood irrigation project with diversion structure on McEachern Creek. Completed in 1937.	305		2,995.56
South Saskatchewan River Storage	Saskatoon Sask.	Concrete weir across South Saskatchewan River to raise water level at low stages of flow by about 11 feet. Completed early in 1940.		2,760	290,446.04
Maple Creek Development		Construction of works along Maple Creek for irrigation of hay lands. Includes the Downie Lake, Tenaille Lake, Junction Reservoir and Gap Creek projects, as outlined below.			
Downie Lake Reservoir.	Tp.9-28-3	Earthfill dam and diversion works for storage water for delivery to Maple Creek Project. Completed in 1938.		10,000	127,439.60
Junction Reservoir	5-12-26-3	Earthfill dam and reservoir for storage of water for irrigation along Maple Creek. Completed in 1939.		10,000	52,397.79
Tenaille Lake	Tp.13-26-3	Diversion canals from Maple Creek to bed of Tenaille Lake for storage in Maple Creek Project.		3,260	20,529.35
Maple Creek Irrigation Project	Maple Creek	Development of irrigation near Town of Maple Creek	3000		84,825.94
La Fleche Dam	LaFleche Sask.	Storage dam in town of LaFleche for domestic and stockwatering use. Constructed in 1940.			2,525.48

SASKATCHEWAN (continued)

Project	Location	Description of Project	Irrigable area (acres)	Storage Capacity ac. ft.	Cost of construction and land purchase
Qu'Appelle Valley Irrigation Project		Development of irrigable lands along the Qu'Appelle Valley with water supplies from Buffalo Pound Lake and Last Mountain Lake. Includes Buffalo Pound Lake, Last Mountain Lake and Lebret projects.			2,525.48
Buffalo Pound Lake	31-18-24-2	Dam across outlet from Buffalo Pound Lake to provide for irrigation of Qu'Appelle Valley.	5300	35,000	75,049.30
Last Mountain Lake	Valeport, Sask.	Dyke and control structure in Qu'Appelle valley to control level in lake.	1000		16,642.26
Lebret	Lebret	Riprap for shore protection against future flooding on Lebret Lake. Work done in 1940.			12,253.36

LARGE WATER DEVELOPMENT PROJECTS COMPLETED OR UNDER CONSTRUCTION IN ALBERTA, MARCH 31, 1941

Project	Location	Description of Project	Irrigable area (acres)	Storage Capacity ac. ft.	Cost of construction and land purchase
Eastern Irrigation District					
Sutherland Dam E.I.D.	Brooks, Alberta.	Dam across Lone Tree Creek to store waste water from E.I.D. works. Completed in 1936. Total cost $21,777.87 of which P.F.R.A. contributed $15,000.00.		8,000	15,000.00
Cowoki Dam	Tp.18-13-4	Dam to form reservoir to store water for irrigation. Cost to E.I.D. $30,000.00 of which the P.F.R.A. contributed $7,500.00.	2280	14,000	7,490.00
Rolling Hills Irrigation E.I.D.	Tps.14& 15 Rges.12,13 & 14-4.	Development of large area for irrigation from Lake Newell. Completed in 1940.	25000	Lake Newell	46,858.78
Canada Land & Irrigation Co.	Vauxhall, Alberta & District	Rehabilitation of existing project, including repairs to dam at Carseland, Alberta, and to 110 miles of canal. Completed 1936.	45000 (approx)		80,000.00
Mountain View Irrigation Dist.	Tps. 2 & 3 Rges.27 & 28-4	Grant made to repair existing canals and laterals. Water diverted from river.	4200		2,497.78
Wildhorse Dam.	23-2-3-4	Storage from Sage Creek for irrigation and stockwatering. Completed in 1936. Since repaired.	3600	4,500	24,369.78
Atlee Gas Well	10-23-7-4	Exploratory boring to determine if natural gas is available in sufficient quantity to provide power for pump irrigation of river flats along Red Deer River. Boring 1300 ft. deep. Flow of gas approximately 100,000 cu. ft. per day. Completed in 1938.			26,722.78

ALBERTA (continued)

Project	Location	Description of Project	Irrigable area (acres)	Storage Capacity ac. ft.	Cost of construction and land purchase.
Bartman Dam	3-25-11-4	Dam on East Berry Creek for stockwatering and irrigation. Completed in 1938.	1000	3,000	34,503.58
Bullshead Creek	28-8-4-4	Dam to provide stockwatering and irrigation along creek channel. Completed in 1940.	800	1,130	8,170.45
Red Deer River Test Borings.	Tp.37-22-4	Exploratory borings across bed of Red Deer River to determine foundation conditions for proposed dam. Completed in 1939.			4,890.00
St. Mary River Test Borings.		Exploration of dam site on St. Mary River. Completed in 1939.			2,148.00
Leavitt Irrigation District	Tp. 2-28-4	Construction of dam to store water in Driggs Lake for irrigation. Completed in 1939.	7000	7,050	62,880.84
Magrath Irrigation District	Tp.5-23-4	Repairs to existing main canal. Completed in 1939.	4955		2,755.58
Test Borings Castle River	Tp.6-2-5	Foundation investigations for dam on Castle River. Completed in 1939.			1,858.12

Significance of the P.F.R.A. Water Development Program

The P.F.R.A. Water Development Program has resulted in marked improvements in prairie agriculture. By providing water supplies where such supplies were formerly inadequate or entirely lacking, it has improved living conditions on thousands of prairie farms. Through the development of stock-watering and irrigation facilities it has enabled many farmers to offset the risk attaching to the exclusive production of wheat, by raising some live stock and home-grown supplies of forage and garden crops. Similarly, it has made possible an increased and more dependable production of live stock on ranching areas.

The extent to which water development has improved the conditions affecting the live stock industry in Western Canada may be shown by the following estimates of the possible beneficial use of completed P.F.R.A. projects.

Irrigation Projects   Irrigable land in P.F.R.A. projects, constructed or under construction, amounts to over 135,000 acres in large projects and some 25,000 acres in small projects, or roughly, 160,000 acres in all. At a modest estimate this acreage, if fully utilized for forage production under irrigation and used in conjunction with rangeland grazing, should make possible an increase in the average live stock production of the Canadian prairies equivalent to over 300,000 head of cattle.

Stockwatering Projects   The storage capacity of large P.F.R.A. water development projects is somewhat over 300,000 acre feet of water, of which probably 200,000 acre feet is available for stockwatering. Small water storage projects have a total capacity of around 50,000 acre feet. The total capacity of P.F.R.A. reservoirs which is available for stockwatering is approximately 250,000 acre feet. Theoretically, on the assumption that one acre-foot of water efficiently stored is sufficient to water 70 head of mature cattle for one year, the above total of 250,000 acre-feet should meet stockwatering requirments of 17,500,000 head of cattle or horses. Limitations of location, seepage losses, and seasonal fluctuations in the amount of run-off stored in the reservoirs would markedly reduce this estimate. Actually, about one million head of live stock were benefited in 1940 by P.F.R.A. stockwatering projects. Inasmuch as practically all of these projects represented new construction, and as utilization in 1940 was far below capacity, it is probable that sufficient new water storage has been provided to carry several million head of livestock.

Thus the water development program, through its irrigation and stockwatering projects, makes possible more dependable, and if necessary more extensive, live stock production on the Canadian prairies.

PROGRESS OF P.F.R.A. CULTURAL WORK

In broad outline the P.F.R.A. Cultural program was continued during 1940-41 on very much the same lines as in previous years. Despite considerable retrenchment, due to war conditions, no important phase of the work was abandoned. Indeed, many phases of rehabilitation work have been rendered more than ever necessary by war conditions. This applied particularly to the changes in cropping practices involved in the reduction of wheat acreages and increased production of feed grains and grasses. Reorganization of prairie agricultural settlement, initiated as part of the P.F.R.A. program, has become more important in view of probable post-war settlement requirements. For these reasons among others, the rehabilitation program remains a work of national importance.

A brief summary of P.F.R.A. cultural activities during 1940-41 is presented herewith. For more detailed descriptions of projects and methods, reference may be made to previous reports.

Dominion Experimental Farms Seven Dominion Experimental Farms and Stations, located in the Prairie Provinces, served in 1940-41 as centres for P.F.R.A. Cultural work. These are located at Brandon and Morden in Manitoba, Indian Head, Swift Current and Scott in Saskatchewan, and Lethbridge and Lacombe in Alberta. In addition, the Dominion Range Experiment Station, Manyberries, Alberta, promoted rehabilitation activities in ranching areas. (See Map 1, page 57)

District Experiment Sub-Stations District Experiment Sub-Stations have been the principal agencies, established under the P.F.R.A. for the trial and demonstration of various new cropping and tillage practices in the drought area. Comprising usually 640 acres of land, these sub-stations are private farms operated under government supervision, but with no advantages in soil or equipment over other farms in the neighbourhood. They have been located at representative points throughout the P.F.R.A. area, and cover practically all types of prairie farm enterprise.

During 1939 there were 52 sub-stations in operation. In 1940 this number was reduced to 46 through the closing of sub-stations at Avonlea, Dunblane, Herbert, Parkbeg, Piapot and Weyburn in Saskatchewan. Sub-stations in operation during 1940 in the various Experimental Farm territories were as follows:

Brandon Territory-Boissevain, Crystal City, Goodlands, Hargrave, Lyleton and Pipestone, all in Manitoba.

Indian Head Territory-Alameda, Arcola, Aylesbury, Davidson, Lisieux, Radville, Strasbourg and Willowbunch, all in south-eastern Saskatchewan.

Swift Current Territory-Canuck, Carmichael, Fox Valley, Gravelbourg, Kincaid, Limerick, Riverhurst, Shackleton, Shaunavon, Tompkins, Tugaske and Valjean, all in southwestern Saskatchewan.

Scott Territory-Guernsey, Juniata, Kindersley, Loverna and Rosetown, all in west-central Saskatchewan. Also Consort and Metiskow in central Alberta.

Lethbridge Territory-Acadia Valley, Bindloss, Cessford, Claresholm, Craigmyle, Foremost, Lomond, Nobleford, Pincher Creek, and Whitla, all in southern Alberta.

Lacombe Territory-Castor, Drumheller and Rockyford in central Alberta. Prior to 1940 these three sub-stations were supervised from Lethbridge.

The location of the foregoing sub-stations is shown on Map 1, page 57 of this report.

During the early years of the rehabilitation program the principal objective of the sub-stations was the control of soil drifting. Convincing demonstration was given of the effectiveness of various control measures, such as strip farming, trash covers and suitable tillage practices. With the advent of more favourable weather conditions in 1938, the urgency of soil drifting control work was diminished temporarily. Considerable attention is now being given on the sub-stations to newer problems; some, like the control of wheat stem saw fly, which has become increasingly pressing where strip farming has been adopted, and others, such as the reduction in wheat acreage, which arise from existing war conditions. The possible recurrence of severe soil drifting conditions, however, is not lost sight of, and each sub-station serves in its particular district to keep attention focussed on safe farm practices.

Agricultural Improvement Associations

For the purpose of securing the co-operation of prairie farmers in promoting the aims of the P.F.R.A. program, especially as regards community action on problems arising from drought and soil drifting, Agricultural Improvement Associations have been organized among farmers throughout the drought area. Popularly known as A.I.A.s, these Associations have been highly influential in improving general farm practices on the Canadian Prairies.

The success of the A.I.A. movement has been reflected in the growth of associations and membership. During 1935 some 31 associations with 2600 members were organized. By the end of 1939 there were 204 associations with 32,000 members. In 1940 these numbers increased to 210 associations with a total membership of 33,600 farmers, or nearly one-fifth of all farmers in the P.F.R.A. area.

During the first five years of the P.F.R.A. program annual grants, ranging from $50.00 to $100.00, according to number of members, were made by the government to each association. This form of assistance was withdrawn in 1940. The increase in number of associations and membership in 1940, however, would indicate that the strength of the A.I.A. movement lies in its inherent worth to prairie farmers and not alone in governmental sponsorship.

Seed Potato Eye Distribution During 1940 the policy, originated in 1939, of distributing small lots of eye-sets of certified seed potatoes to members of A.I.A.s was continued. Approximately 11,500 members received the parcels of potatoes, usually containing 50 eye sets.

In the aggregate some 950 bushels of potatoes were used in this distribution, while the resultant return to farmers was in the neighbourhood of 19,600 bushels. Including the distribution during 1939, the total distribution of potato eyes to date has covered 30,500 parcels, requiring the purchase of 2590 bushels of certified seed potatoes, and yielding some 37,000 bushels of good potatoes. The effect of this work has been to greatly improve the quality of potatoes used for seed in the drier districts of the Prairie Provinces.

RECLAMATION PROJECTS UNDER THE P.F.R.A., 1940

TABLE 6

Location of Project	Acres in Project	Year Started	Experimental Farm Conducting Work	Progress of work on Project
Melita, Man.	1280	1935	Brandon, Manitoba	Land completely reclaimed for crop production. Now being used for extensive experimental work.
Craik, Sask.	180	1937	Indian Head, Sask.	Completely reclaimed for grass by 1939.
Aylesbury, Sask.	950	1936	" " "	Regrassing in progress. Crested wheat grass hay harvested in 1940 on 200 acres.
Kisbey, Sask	765	1936	" " "	Drifting controlled by 1939. Regrassing in progress.
Britannia School, Sask.	770	1937	" " "	Drifting controlled. Regrassing yet to be done.
North Portal, Sask.	235	1938	" " "	Drifting controlled. Regrassing in progress.
Estevan, Sask.	958	1938	" " "	400 acres regrassed, remainder under barley and rye in 1940.
Silton, Sask.	150	1940	" " "	New project. To be regrassed.
Blucher, Sask.	411	1940	" " "	New project. Regrassing of several areas.
Handsworth, Sask.	414	1939	" " "	Seeded to barley and later to fall rye in 1940. Drifting completely controlled.
Mortlach, Sask.	1280	1936	Swift Current, Sask.	Regrassing in progress. Part of area now under crop production.

TABLE 6 - Reclamation Projects (cont'd)

Location of Project	Acres in Project	Year Started	Experimental Farm Conducting Work	Progress of work on Project
Cadillac, Sask.	800	1936	Swift Current, Sask.	Successfully reclaimed by 1938. Produced good hay crop plus 16,000 lbs. of crested wheat grass in 1940.
Meyronne, Sask.	240	1937	" " "	Reclaimed by 1939. Grass making slow growth.
Vanguard, Sask.	3200	1939	" " "	Drifting checked. Under volunteer rye in 1940. 900 acres regrassed.
Youngstown, Alta.	320	1936	Lethbridge, Alta.	Completely reclaimed by grass in 1938.
Cereal, Alta.	150	1938	" "	Drifting controlled. Regrassing in progress.
Hulton, Alta.	160	1935	" "	Completely reclaimed by grass. Producing crested wheat grass seed.

Two new reclamation projects, at Silton and Blucher, were started during 1940 in the Indian Head territory of Saskatchewan.

Reclamation Projects

For the purpose of determining the best methods of re-establishing crop production on areas which have been temporarily abandoned due to soil drifting, or of returning severely drifted sub-marginal areas to permanent grass cover, reclamation projects have been started at 17 locations throughout the drought area. The total area covered by these projects is 12,263 acres.

The general procedure for conducting a reclamation project has been to select an area of drifting soil on which farming by ordinary methods was no longer possible, and to determine how drifting could be stopped and the land returned to economic production of grass or crops. For the most part the land in these projects, being decidedly submarginal, has been returned to grass. In such cases the beneficial result to agriculture has been the removal of the menace of continual drifting to adjacent good land. In two projects, however, at Melita, Manitoba and Mortlach, Saskatchewan, considerable progress has been made in returning the land to crop production. The principal findings made in the various projects have been outlined in the Report on Cultural Activities under the Prairie Farm Rehabilitation Act for the fiscal year ending March 31, 1940. A list of these projects, with some observations on the progress of the work, is presented in Table 6.

TREE PLANTING

Tree planting, with the object of improving living conditions on prairie farms, and of providing shelter to gardens and buildings against strong winds, has been practised in the Prairie Provinces for a number of years. Since 1930 the Experimental Farms Service has been distributing free planting material to prairie farms, continuing a service originally provided by the Dominion Department of the Interior. Insofar as the distribution of free trees applies to the P.F.R.A. area, this service now forms an integral part of the rehabilitation program. From the inauguration of the program in 1935 to the end of 1940, a total of 11,137,140 free trees have been distributed under the P.F.R.A., of which 2,827,965 trees were supplied in 1940.

Field Crop Shelterbelt Experiments

The most distinctive phase of tree planting work under the P.F.R.A. has been the experimental planting of large scale shelterbelt systems by Field Crop Shelterbelt Associations. Four of these associations have been organized, each composed of farmers located on a compact group of farms covering approximately one township of 36 square miles. These farmers have undertaken, with government assistance, to plant and maintain shelterbelts around their fields with the object of determining to what extent a fairly extensive system of shelterbelts will exert a beneficial influence on crop production by reducing the erosive and drying effects of strong winds and by trapping snow for the local increase of soil moisture. Farmers associated with the government in this work have received free tree seedlings, as well as financial assistance for planting and care of shelterbelts. The four associations in operation are located at Lyleton, Manitoba; Conquest, Saskatchewan; Aneroid, Saskatchewan; and Porter Lake (Ribstone), Alberta. By the end of 1940 these associations had planted nearly 700 miles of shelterbelt, consisting mostly of Caragana hedge, but with some ash, elm and maple as local conditions might warrant.

The largest and oldest of the association plantations is located at Conquest, where some 383 miles of shelterbelts have been planted by 76 farmers, representing the majority of farms throughout a block of land covering 63 square miles. This project was started in 1935 and despite some very adverse seasons, definite progress has been made, some of the shelterbelts being in 1940 from 5 to 7 feet high.

The shelterbelt plantations at Lyleton with 246 miles of shelterbelt, and Porter Lake with 26 miles of shelterbelt, while somewhat smaller than at Conquest, have similar objectives and are making similar progress. At Aneroid, however, the ravages of drought and insects have proved very discouraging to association members. Nevertheless, at this location some 43 miles of shelterbelt have been planted.

The results of the foregoing tree-planting experiments will not be available for several years.

General Conditions Affecting Tree Planting in 1940

With the exception of a few areas, weather conditions in 1940 were generally favourable for tree growth throughout the Prairie Provinces. These conditions are in sharp contrast with those obtaining during the drought years 1930 to 1937, with the result that both new planting and established plantations have made satisfactory growth.

In certain districts outbreaks of cankerworm, Cecropia moth, blister beetles and grasshoppers caused considerable damage to trees. Where spraying was done to control cankerworm the results have been very encouraging.

REGRASSING

The outstanding characteristic of agriculture in the Prairie Provinces of Canada is the great predominance of cereal culture and grazing over other forms of agricultural production. In 1940, nearly 61 per cent of the agricultural land in the Prairie Provinces was under cereal culture and 37 per cent in grazing, while cultivated hay and non-cereal crops accounted for only 1.4 and 0.6 per cent respectively. Under existing conditions there is little opportunity for expansion in the production of other than grass or cereal crops, while cereal production has been for some years in excess of market requirements. It is evident, therefore, that more extensive and intensive grass production, marketable through live stock, presents attractive possibilities for economic utilization of prairie lands. This condition is the basis of the P.F.R.A. regrassing program.

An effective regrassing program for the Prairie Provinces would seem to have four main objectives.

1. The improvement of herbage on rangeland at present under grazing.
2. The establishment of grass on marginal or submarginal land which has been cultivated and subsequently abandoned.
3. The reclamation with grass of focal areas of soil drifting.
4. The introduction of grass in cropping systems for the production of forage and for soil improvement.

The first of these objectives, the improvement of grazing on rangeland, is largely a problem of range management

and as such has been since 1928 a major subject of investigation on the Dominion Range Experiment Station at Manyberries, Alberta, and more latterly on the P.F.R.A. Community Pastures. To the other objectives the P.F.R.A. program has made material contributions, through its investigational and demonstrational activities. These activities have been conducted through regrassing demonstrations, reclamation projects, and by the distribution of seed for the establishment of seed-plots by members of Agricultural Improvement Associations.

The magnitude of P.F.R.A. regrassing work is shown in the following statement of acreages regrassed through different agencies.

P.F.R.A. Regrassing Activities, 1940

TABLE 7

Regrassing Activity	Number of locations where regrassing done	Total Area regrassed to date (acres)
Regrassing Demonstrations	813	23,460
A.I.A. Seed Plots	20,000	113,500
Reclamation Projects	17	8,145
Community Pastures	23	63,581
Total		208,686

The addition of some 25,000 acres regrassed in airports would bring the foregoing total up to over 233,000 acres. This total, appreciable in itself, constitutes a persuasive demonstration of regrassing for the benefit and guidance of prairie farmers.

Regrassing During 1940

During 1940 regrassing work continued along the lines described in previous reports. Regrassing demonstrations, ranging in character from simple isolated trials to planned groups of experiments were in progress at 813 locations. Small seed plots for the increase of grass seed, sponsored by A.I.A.s had been established by 1940 on some 20,000 private farms. Regrassing is an important phase of land reclamation work. Both the regrassing demonstrations and A.I.A. seed plots have contributed very strongly to making possible the current government program for the temporary withdrawl of land from wheat production. Regrassing work on Community Pastures and airports is described below.

Regrassing on Community Pastures

In connection with the establishment of Community Pastures on submarginal areas by the Land Utilization Branch of the Prairie Farm Rehabilitation administration in Regina, a considerable acreage of weedy or overgrazed land has been seeded down to grasses, largely crested wheat grass. The actual seeding has been done by the Experimental Farms at Brandon, Man., Indian Head, Sask., Swift Current, Sask., and Scott, Sask. This regrassing work was undertaken on the basis of grazing surveys conducted from Swift Current. By the end of 1940 some 63,581 acres in Community Pastures had been regrassed, of which area 5223 acres were covered in 1940. The average cost per acre for regrassing over a four-year period has been $1.07.

In general, this regrassing work has consisted of drilling in grass or legume seed, mostly the seed of crested wheat grass, at a rate of a few pounds per acre. The bulk of this seeding has been done with large tractor-drawn seeding outfits, operated by the Dominion Experimental Farms. In some cases, local farmers have been engaged to do seeding with their own equipment. Seed for this work has been supplied by the Land Utilization Branch of the P.F.R.A. administration.

In connection with the foregoing work, a considerable amount of fact-finding has been possible. As this program of regrassing has been conducted on a large scale, covering over 63,000 acres, the results will be of great value in guiding future work.

Airport Regrassing

The regrassing technique developed during the course of the P.F.R.A. program has proved to be particularly useful in connection with the development of military aviation in the Prairie Provinces. The construction of a large number of airports for training purposes on the prairies has involved extensive land levelling operations, with a resulting exposure of bare soil and subsoil to wind erosion. The undesirable effects of such erosion in general, and particularly as regards damage to airplanes, has made imperative the rapid establishment of vegetative cover on airports. For the supervision of this work, undertaken primarily by the Department of Transport, the Experimental Farms Service has been able to contribute the services of officials who have had broad experience in the regrassing and reclamation activities of the P.F.R.A. program.

In the summer of 1940 inspections were made by Farm officials of a number of airports with a view to determining suitable regrassing procedure. On the basis of these inspections regrassing operations were started in the fall. In general, bare areas were sown with oats or fall rye to give temporary protection, and later seeded to grasses, while areas already protected by weeds or stubble were seeded directly with suitable grasses. In the aggregate, including work done in the spring of 1941, regrassing on some 25,000 acres of land on some 38 airports has been successfully undertaken under Experimental Farm supervision.

Methods of Regrassing

Brief outlines of the technique of regrassing, which has been largely evolved through P.F.R.A. work, have been presented in previous reports. This subject is dealt with somewhat fully in the recently issued Publication No. 720 of the Dominion Department of Agriculture, entitled "Regrassing Abandoned Farms, Submarginal Cultivated Lands and Depleted Pastures in the Prairie Areas of Western Canada". Copies of this publication may be secured from the Publicity and Extension Division, Department of Agriculture, Ottawa.

Seed Supplied for Regrassing Projects

Supplies of grass and legume seed for reclamation and regrassing projects under the P.F.R.A. Cultural program are secured through the purchasing facilities of the Plant Products Division of the Dominion Department of Agriculture. The total amounts of seed purchased during the fiscal year, 1940-41, as well as previous amounts and the total to date, are shown below:

Amounts of Grass and Legume Seed Purchased for P.F.R.A. Cultural Work, to March 31, 1941.

TABLE 8

Species	Total to March 31, 1940	1940-41	Total for 6 years to March 31,1941.
	Lbs.	Lbs.	Lbs.
Grasses			
Crested Wheat Grass	620,250	110,500	740,750
Brome Grass	215,150	57,150	272,790
Slender Wheat Grass	20,990	3,000	23,990
Timothy	2,000	--	2,000
Reed Canary Grass	2,050	450	2,500
Creeping Red Fescue	2,200	--	2,200
Sudan Grass	300	--	300
Mixed Grasses	12,500	--	12,500
Red Top	400	200	600
Legumes			
Alfalfa	147,110	34,500	181,610
Sweet Clover	226,200	24,200	250,400
Alsike	1,500	--	1,500
TOTALS	1,261,140	230,000	1,491,140

From the foregoing statement it will be seen that nearly one and one-half million pounds of grass and legume seed have been used in regrassing work since the inauguration of the P.F.R.A. cultural program. Crested wheat grass seed has accounted for about one-half of the total, the remainder being made up largely of brome grass, sweet clover and alfalfa.

Crested Wheat Grass

In connection with the regrassing program the introduction to prairie agriculture of crested wheat grass has proved highly beneficial. This grass, a native of the dry plains of Russia, was introduced to America by the United States Department of Agriculture in 1898, and to Canada through the University of Saskatchewan in 1915. Its value for use on the Canadian prairies was largely determined in experiments conducted by the University of Saskatchewan and, since 1927, at the Dominion Range Experiment Station, Manyberries, Alberta.

Crested wheat grass has proved to be the best cultivated grass for general regrassing work under the P.F.R.A. It is highly resistant to extremes of cold and heat, survives prolonged drought, and grows satisfactorily for a longer period of years than the other cultivated grasses which are grown in the Prairie Provinces. Crested wheat grass competes at an advantage with annual weeds, and has proved to be the only pasture herbage which can compete successfully with prairie

sage on run-down pastures. For these reasons crested wheat grass has been the principal species used to meet the rigorous requirements of rehabilitation work.

The use of crested wheat grass on the Canadian prairies has increased appreciably in recent years, very largely as a result of P.F.R.A. work. In 1935 there were, in the area coming under the Act, only 4,800 acres of crested wheat grass. By 1940, the acreage known to be under this grass had increased to over 270,000 acres, while the acreage not accounted for was probably large. In this connection, it is interesting to note that the acreage seeded in 1941 to grass in the Prairie Provinces, under the current Wheat Acreage Reduction policy, amounts to over 517,000 acres. A very considerable percentage of this acreage was seeded with crested wheat grass.

The growing use of crested wheat grass has created a strong demand for the seed of this crop, both in Canada and the United States. Production of this seed in the Prairie Provinces has grown from 750,000 pounds in 1935 to several million pounds in 1940. In the latter year, over 1,900,000 pounds of crested wheat grass seed were produced on land seeded through P.F.R.A. agencies.

In view of the foregoing statements, therefore, it would seem that the regrassing program, especially as regards the use of crested wheat grass, is making a needed contribution to the solution of problems arising from both the drought and the war emergency.

PASTURE SURVEYS

In connection with the P.F.R.A. program of utilizing submarginal lands for grazing purposes, and of devising improved methods of range land management, pasture surveys have been conducted for the four years 1937 to 1940 by the Dominion Experimental Station, Swift Current, on a number of areas throughout the drought area. The object of these surveys is to determine the carrying capacity of different areas, having regard to soil, herbage, water supplies and various other considerations.

The acreage and principal areas covered by pasture surveys in the past three years are as follows:

Pasture Surveys under the P.F.R.A.
1937 to 1940 inclusive

TABLE 9

Year	Area Surveyed	Acres
1937	Special Areas of Alberta & ranches in Sask.	592,640
1938	Great sandhills & Community Pastures in Sask.	809,620
1939	Community Pastures and Ranches	1,043,940
1940	Community Pastures and Ranches	441,180
	TOTAL	2,887,380

Work of the Dominion Forage Crops Laboratory Saskatoon, Sask.

The projects being conducted under the P.F.R.A. at the Dominion Forage Crops Laboratory, Saskatoon, Sask., are of three general types, namely; (1) breeding for improved types of forage crops, (2) determination of the best methods of securing stands of grasses and legumes, and (3) increase of seed stocks. Each phase of the work will be discussed separately.

It is realized that one of the main factors contributing to the difficulty of securing catches of the grasses on the prairies is the fact that all the adapted grasses have small seeds, and consequently shallow seeding is essential. A perennial grass having large seeds would materially assist in overcoming this problem. No such grass was available so one of the main breeding activities under P.F.R.A. has been an attempt to develop such a grass by crossing wheat with grasses closely related to crested wheat grass. Certain of these grasses crossed readily with wheat, and some of the hybrids were slightly fertile. Fertility has increased with each generation, and a fair amount of seed was available for planting the fifth generation in 1940. As yet it is too early to prophesy as to the final outcome of the work, but it is hoped that through the application of various breeding methods the objective can be attained.

In areas where alfalfa is well adapted, mixtures of this legume with grasses have proven to be superior to the grass alone. On the open prairie ordinary alfalfa will, however, not survive under heavy grazing. A search for adapted hardy pasture types has been made as a P.F.R.A. project. Such plants are available but so far they have all been unpractical due to very poor seed yield. An effort is being made to improve them in regard to this latter character.

Another breeding problem partially assisted by the P.F.R.A. consists of the development of low-coumarin sweet clover. The relationship between coumarin content of sweet clover and the "Malilot Taint" of wheat is also being investigated.

An intensive investigation of methods of securing catches of grasses and legumes under varying soil conditions has been conducted. The influence of such factors as depth of seeding and date of seeding has been studied, and the results provide a sound basis on which to make recommendations to farmers and others. Connected with these investigations has been a study of methods of regrassing badly depleted pastures, and of rejuvenating old stands of brome grass.

The third phase of P.F.R.A. activities has to do with the increase of seed stocks of grasses and legumes. The seed production of crested wheat, in particular, has been sponsored. Information has been provided on handling this and other crops for seeding production. In the past a good deal of assistance was provided in the purchase of the P.F.R.A. grass and legume seed requirements. The increase of new improved varieties of forage crops has received a good deal of attention.

AGRICULTURAL DEVELOPMENT OF IRRIGATION PROJECTS

Under the Water Development Branch of the Prairie Farm Rehabilitation Administration at Regina, a number of large irrigation projects have been constructed or are under construction in various parts of the drought area. Agricultural development of these projects is part of the cultural program. Details of this work are presented on pages 15-17 of this report.

Small Irrigation Projects

Since the inauguration of the P.F.R.A. program in 1935, some 905 farmers have been assisted in the construction of small irrigation projects. For the most part these farmers had no previous experience in irrigation practice. In view of the manifest advantage to be derived from the irrigation of garden produce and forage crops on dry land farms, the Dominion Experimental Farms have made available to farmers the services of practical irrigators. These irrigators assist beginners in laying out ditches, levelling land and in the art of applying water to crops.

During 1940 over 400 farmers were assisted in their irrigation problems. In the eastern part of the P.F.R.A. area considerable attention was given to the irrigation of farm gardens from dugouts. Further west, the main type of project was designed to supply dependable supplies of forage crops. On projects with water storage facilities, which enable summer irrigation, the growing of alfalfa is becoming important. With flood irrigation projects, where spring run-off water is diverted from stream channels to nearby level land, considerable attention is given to the improvement of grass for hay or pasture.

CONTACT WITH FARMERS IN THE CULTURAL PROGRAM

By reason of the nature of its work the Dominion Experimental Farms Service comes into direct contact with thousands of farmers each year. In fact, these contacts are made by farmers seeking information on various aspects of agriculture, but there is also an appreciable number of contacts made by Experimental Farm officials in the course of their investigational work, especially as regards the practical application of the results of research. Throughout the area coming under the provisions of the P.F.R.A. there is, in addition to the normal intercourse between farmers and Farm officials, effected by visits by farmers to Experimental Farms and by correspondence, a wide field of contact through A.I.A. activities.

A.I.A. Meetings in 1940

During 1940 officials of the Dominion Experimental Farms took part in 171 A.I.A. meetings at which the total attendance was 8700. In general, these meetings were addressed by Farm officials at the request of the A.I.A. members, and discussion took place on such rehabilitation topics as seemed most suitable under local conditions. Wherever feasible, motion pictures or lantern slides were used to illustrate talks. In many cases demonstrations on household science were presented for ladies attending the meetings.

Field Days on District Experiment Sub-Stations - Field days, with a total attendance of 8280, were held on all substations during 1940. By means of these field days farmers have been able to observe, under expert guidance, the results of various lines of sub-station work, and to secure advice on adapting different farm practices to conditions obtaining on their own farms.

Visits to Private Farms In the normal routine of cultural work Farm officials visited, during 1940, approximately 6000 private farms. Such visits have proved mutually beneficial to farmers and officials.

Some Useful Results of P.F.R.A. Cultural Research

In common with all lines of agricultural investigation, P.F.R.A. research work must be conducted for several years before definite results can be obtained and practical applications evolved. In view of the fact that many P.F.R.A. cultural projects have been in progress for from three to six years, and as some of the results secured to date are of timely interest, the results of several projects are presented in this Report.

Information is presented on the following topics:

Soil Surveys

Basin Listing Trials

Sawfly control experiments.

SOIL SURVEYS

The purpose of soil surveys is to make an inventory of soil resources, by determining the nature, extent and location of various types of soil. Such an inventory provides indispensable basic information for research in various phases of crop production and facilitates the logical application of the results of such research. Soil surveys also provide basic data for the study of various social and economic problems, such as land settlement and taxation. The farmer benefits directly from soil surveys by securing information regarding the nature and management of soils on his farm, and indirectly from whatever improvements in economic and social policy which result from increased knowledge of soil resources.

Soil surveys in the Prairie Provinces have been conducted since 1921, but prior to 1935 progress was somewhat desultory. With the inauguration of the P.F.R.A. program, however, a concerted effort was initiated to secure a complete coverage of the drought area. This work has been conducted by the Dominion Experimental Farms through and in co-operation with the Soils Department of the Universities of Manitoba, Saskatchewan and Alberta.

Soil surveys in the Prairie Provinces may be classified under four main headings, depending on the purpose for which the different surveys are made.

1. Preliminary Surveys - These are exploratory surveys designed to determine the general characteristics of the soil of an extensive area.
2. Reconnaissance Surveys - This type of survey is most widely made in Western Canada. In reconnaissance surveys the soils are examined and classified along traverse lines about one mile apart.
3. Detailed Reconnaissance Surveys - In these surveys the traverses are made at one-quarter to one-half mile intervals. Detailed reconnaissance surveys are made where local soil problems may justify considerable accuracy in mapping.
4. Detailed Surveys - In which all soil boundaries are accurately mapped, and minor differences in soil type recorded. This type of survey is made on Experimental Farms, irrigation projects, and in connection with some special soils investigations.

Extent of Soil Surveys in the Prairie Provinces

The total area in the Prairie Provinces which had been covered by soil surveys by the end of 1940 was 127,368,200 acres. This figure includes 24,000,000 acres covered by preliminary surveys in Northern Alberta, and 103,367,900 acres covered by reconnaissance surveys in the more settled areas of the Prairie Provinces. The area covered by reconnaissance surveys represents about two thirds of the settled area in the Prairie Provinces. Reconnaissance surveys have been made of 11,443,100 acres in Manitoba; 66,278,400 acres in Saskatchewan and 25,646,500 acres in Alberta. Of these acreages, 10,199,100 acres in Manitoba, 4,496,500 acres in Saskatchewan and 14,285,400 acres in Alberta, or a total of 28,981,000 acres have been surveyed under the P.F.R.A. In addition, some of the area covered in reconnaissance has been resurveyed under the P.F.R.A. in detailed reconnaissance and detailed surveys. Detailed reconnaissance surveys have been made of 2500 acres in Manitoba, 1,976,700 in Saskatchewan and 35,800 acres in Alberta, or a total of 2,015,000 acres. Detailed surveys account for 1500 acres in Manitoba, 123,700 acres in Saskatchewan and 2800 acres in Alberta. The foregoing statistics indicate that while the bulk of the P.F.R.A. survey work in Manitoba and Alberta has been in reconnaissance, considerable time has been spent on more detailed work in Saskatchewan.

Characteristics of Prairie Soils

The soil survey work outlined above has enabled a reasonably clear and logical classification of Canadian prairie soils. Prairie soils exhibit to a marked degree the influence of climate and vegetation, modified locally of course by topography and texture. In the southwestern short grass region the chief visible characteristic is their light brown colour from which the area derives the name of "Brown soil zone". This colour is due to a relatively low content of organic matter, the result of sparse vegetation and rapid oxidation. These soils show only slight evidence of leaching, soluble salts being accumulated in "lime" and "gypsum" layers near the surface, while surface accumulations or "alkali" spots are of frequent occurrence. The region occupied by the Brown Soils forms a rough triangle of about 34 million acres in area, with its base extending along the International Boundary, from Estevan in southeastern Saskatchewan to Coutts in southeastern Alberta, and with its apex just east of the town of Coronation in Alberta. (See Map 4, page 60.)

Beyond the Brown Soil region in a zone ranging in width from 40 to 80 miles, and covering some 30 million acres, occur soils of a dark brown colour which reflect the influence of more favourable climatic conditions. These soils developed under a heavier grass cover than the brown soils, possess a correspondingly higher content of organic matter and have been subjected to a greater degree of leaching. Much of the best wheatland in western Canada is found in the Dark Brown zone.

East and north of the Dark brown soil zone, and running diagonally across Saskatchewan from southern Manitoba to the district of Edmonton, Alberta, occurs a belt of black soils, corresponding roughly to tall grass parkland. These soils developed under sub-humid conditions are characterized by high humus content, high fertility and greater evidence of leaching than in the Brown soils. Constituting the most fertile farmland, though not necessarily the best wheatland, in Western Canada, the black soils cover an area of about 42.5 million acres.

Beyond the black zone the soils grade off through a transitional zone to the grey wooded soils of the northern

forest, which differ profoundly from the grassland soils of the prairies. The grey wooded soils have been subject to relatively heavy leaching with the resultant loss of much plant food. In some districts, notably central Alberta, the low fertility of the grey wooded soils can be satisfactorily remedied by fertilizer treatments, growing legumes, and the application of sulphur. Aside from their settlement possibilities, however, the grey wooded soils do not enter into the present consideration.

Throughout the Prairie Provinces the major soil characteristics are modified by differences in texture. This is particularly the case with heavy clay soils which form such highly fertile areas as the Red River Plains, the Regina Plains and the Drumheller clays. On the other extreme, dune sands present areas entirely unsuited for farming in several districts, notably near Brandon, Manitoba, and in the Great Sand Hills of Saskatchewan. The bulk of prairie soils are intermediate in texture. In this connection it should be noted that while textural differences, as between sand and clay, for instance, affect more profoundly the use and productivity of soil than do zonal differences, the distribution of types of farming conform very largely to the soil zones. In fact, prior to the construction of the Canadian Pacific Railway in 1885, agricultural settlement showed a marked tendency to follow the broad arc of the black soil zone, as affording the best all-round opportunities for farming.

BASIN LISTING TRIALS IN THE PRAIRIE PROVINCES
1937-1940

Basin listing is a relatively new tillage practice by which numerous small depressions or "basins" are made in the surface of cultivated land with the object of retaining on the land some or all of the rainfall or melted snow which might otherwise be lost as run-off. In order to determine the value of this practice for soil moisture conservation and water erosion control in the Prairie Provinces of Canada, fairly extensive basin-listing trials have been conducted from 1937 to 1940 inclusive by the Dominion Experimental Farms. The results of these trials would indicate that, on the Canadian prairies, basin listing is of little or no value for soil moisture conservation and of limited value in water erosion control. Some details of the basin listing trials conducted by the Experimental Farms are outlined below.

The Basin Lister

Listing is an established tillage practice by which V-shaped furrows are formed at intervals of three or four feet across a field, resulting in a characteristic corrugated appearance. Implements for listing have been in agricultural use for many years. In basin listing, small dams of soil are formed in the listed furrows at intervals of from about 10 to 20 feet, resulting in the basins which are intended to hold surface water against run-off.

Two main types of basin listers are in use:

1. Machines which form the small dams from loose soil at intervals along the listed furrow. This type of implement, more properly known as the damming lister, is constructed by the addition of damming attachments to a straight-furrow lister.
2. Machines which form basins by excavating the soil at regular intervals. The ridges and dams between basins made by this type of implement, properly called the basin lister, are partially of undisturbed soil. The basin lister is more satisfactory for use in heavy uncultivated stubble than the damming lister.

Basin listing was first practised in the central Great Plains area of the United States. One characteristic of climate in that region is that a portion of the relatively light rainfall is received in occasional heavy downpours, with consequent high run-off and soil erosion. Under such conditions the use of the basin lister to check both run-off and erosion has proved fairly satisfactory. Under favourable conditions, practically all of the moisture from a heavy rain may be retained on the land, to soak into the soil, rather than to be largely lost as run-off. The evident advantages of basin listing in the United States led to investigation of its value in Western Canada.

Basin Listing Trials Conducted by Dominion Experimental Farms

Basin listing trials have been in progress since the fall of 1937 at a number of points in the drought area of the Prairie Provinces. These trials were conducted by the Dominion Experimental Farms at Brandon, Manitoba, Indian Head, Saskatchewan, Swift Current, Saskatchewan, and Lethbridge, Alberta. For the most part these trials consisted of simple comparisons between basin listing and no basin listing, conducted on Experimental Farms, District Experiment Sub-stations, and private farms. The procedure generally followed was to basin list part of a field, usually summer-fallow, in the fall, and to observe the effects in comparison with the unlisted area during the following growing season.

The results of the basin listing trials were determined by several methods. In some trials comparable yields from both listed and unlisted areas were secured. In other trials the amount of moisture present in the soil of both listed and unlisted areas was determined in the spring by laboratory methods, while in other trials the depth of visible moisture penetration was determined by soil auger borings. The choice of method was largely a function of available time and labour.

Results of Basin Listing Trials

Since the most important criterion of the value of basin listing is its effect on crop yields, the following table is presented as embodying the essential results of basin listing trials.

From this table it will be observed that the effect of basin listing on the yield of wheat has been quite variable; in 21 trials the yield of wheat has been greater on basin listed than on unlisted land, while in 17 trials the reverse has been true. On the average for all trials the yield from basin listed land has been 22.6 bushels per acre, as compared with 21.8 bushels on unlisted land, a difference of only 0.8 bushel per acre. In view of the variation in results and the small average difference in yield, it would not seem that basin listing has had a definite beneficial influence on crop yields.

As regards the effect of basin listing on the conservation of soil moisture, the average results of investigations have shown a small but inconclusive difference in favour of basin listing. In this respect the results were similar to those secured with crop yield comparisons.

One objection to the practice of basin listing is that it leaves land in a very rough condition for tillage and seeding operations. This factor tends to increase the cost of operations. At Lethbridge it was estimated that the increase in cost of seeding basin listed land would range from 10 to 50 per cent, depending on the depth of the listed furrows.

Crop Yields Secured on Basin Listing Trials
1938-1940 - Dominion Experimental Farms

TABLE 10

Location	Year	Crop	Yield of Grain per ac.	
			Basin Listed bu.	Not Listed bu.
Melita, Man.	1939	Wheat on fallow	18.9	24.8
" "	1940	" " "	20.8	18.3
Boissevain, Man.	1940	" " "	30.2	28.0
Hargrave, Man.	1940	" " "	19.3	11.5
(Dom.Exp.Station (Lethbridge,Alta.	1938	" " "	25.9	27.8
" "	1939	" " "	25.5	23.5
" "	1940	" " "	24.2	19.9
" "	1938	" " stubble	11.5	12.0
" "	1939	" " "	17.1	16.5
" "	1940	" " "	16.0	13.1
Vulcan, Alta.	1938	" " fallow	21.6	18.3
" "	1938	" " "	27.4	25.1
" "	1938	" " "	14.8	14.0
Blackie, Alta.	1938	" " "	26.9	23.1
Lethbridge,Alta.	1938	" " "	31.4	25.8
Foremost,Alta.	1938	" " "	20.8	14.3
Skiff, Alta.	1938	" " "	15.1	11.6
Foremost, Alta.	1938	" " "	21.6	25.8
Foremost, Alta.	1938	" " "	16.0	18.0
Vulcan, Alta.	1938	" " "	22.5	24.5
Skiff, Alta.	1938	" " "	18.3	18.9
" "	1938	" " "	12.5	12.8
Coaldale, Alta.	1938	" " "	27.5	26.0
Foremost, Alta.	1939	Wheat	33.7	25.1
Nemiscam, Alta.	1939	"	13.5	18.2
Etzikom, Alta.	1939	"	13.2	14.1
Milk River,Alta.	1939	"	20.1	17.2
Spring Coulee,"	1939	"	13.5	12.9
Arrowwood, Alta.	1939	"	44.1	46.1
High River,Alta.	1939	"	24.6	25.5
Airdrie, Alta.	1939	"	35.9	35.7
Hussar, Alta.	1939	"	30.6	25.3
Carseland,Alta.	1939	"	18.6	26.2
Standard, Alta.	1939	"	21.4	27.5
Queenstown,Alta.	1939	"	13.3	15.0
Crossfield,Alta.	1939	"	39.2	44.0
Langdon, Alta.	1939	"	22.5	17.0
Chestermans Lake Alta.	1939	"	28.6 --	23.8 --
	Average of 38 trials		22.6	21.8

Many operators found that deeply listed land resulted in very rough going for wheel type tractors, since levelling operations were conducted across the lines of listed furrows. In some instances the difficulty was overcome by attaching double mouldboard ploughshares ahead of each front tractor wheel, thereby producing furrows in which the tractor wheels could move with a minimum of irregular motion.

One of the benefits which were supposed to accompany basin listing was the retention in the basins of run-off water and snow. This advantage, however, seems to have been offset by the relatively greater evaporation from basin listed land as compared with unlisted land. On deeply listed land it was frequently observed that the levelling of dry ridges resulted in a dry seed bed, with poor conditions for seed germination and crop growth.

The value of straight listing for the emergency control of soil drifting has been amply demonstrated in various P.F.R.A. projects. There is no conclusive evidence, however, that the more costly practice of basin listing has any advantage over straight listing for this purpose.

On the whole, therefore, it does not seem that basin listing is an advantageous tillage practice for the Canadian Prairies.

SAWFLY CONTROL EXPERIMENTS

Infestations of the wheat stem sawfly (Cephus Cinctus-Nort) constitute the major hazard to wheat production in several districts of the Prairie Provinces. Experiments to determine the best methods of controlling this pest have been undertaken as part of the P.F.R.A. cultural program. In southern Alberta this work is conducted on the District Experiment Sub-Station at Nobleford, and in co-operation with the Rural Municipality of Grasswold. In southwestern Saskatchewan extensive control measures are being effected through the agency of Agricultural Improvement Associations.

Control of sawflies is based on certain peculiarities in the life cycle of this insect. Sawflies oviposit in the stems of certain plants, notably wheat, oats and brome grass. The resulting larvae, living within the stems of wheat and oats, destroy these plants, but are unable to develop in the stems of brome grass. On certain other crops, notably flax, sawflies do not oviposit. Another important point is that sawflies travel very short distances in search for plants in which to oviposit. These facts lead to two general methods of control:

Control by the use of trap crops Areas of wheat may be protected by surrounding wheat fields with "trap strips" of wheat or oats or brome grass. Where this method is adopted, the wheat or oats may be harvested early for hay, while the brome grass may be harvested or left for further reseeding as desired.

Control by elimination Land seeded to flax may be entirely cleared of sawflies, since no oviposition will take place.

Sawfly experiments conducted under the P.F.R.A. have been designed to determine the best methods of using trap crops. From this work the following tentative conclusions have been drawn.

1. Unfertilized wheat traps should be sown 10-15 days in advance of the main crop.
2. Fertilized wheat traps may be sown at the same time as the main crop but an advance of 1-5 days is slightly preferable.
3. When oats are used as a trap crop it is preferable to sow at least 2 bushels per acre in order that the stems will not be coarse.
4. There is little choice between Legacy, Victory and Banner oats as a trap crop, when the seeding is light.
5. Spring rye used in trap crops should be sown at the same time as, or not more than two days in advance of the main crop.
6. All traps other than oats should be cut for hay between July 10th - 20th.

For A.I.A. sawfly control work in southwestern Saskatchewan the Swift Current Experimental Station distributed 22,520 pounds of brome grass seed in the fall of 1939 and an additional 5000 pounds in the spring of 1940. Already several hundred miles of brome grass strips have been established along roadways in this territory.

REPORT ON SPECIAL ENTOMOLOGICAL WORK CARRIED ON UNDER P.F.R.A.

The peculiar entomological situation in the Prairie Provinces induced by the drought continued to be felt in 1940 and required a continuation of the co-operation with the Division of Entomology in which the normal appropriations of this service were again supplemented to deal with certain special problems of particular importance to the rehabilitation of prairie agriculture. The continued support of the entomological work was concerned with the following activities: (1) Grasshopper egg surveys in Manitoba, Saskatchewan and Alberta in anticipation of the outbreak of 1941 and the printing and making available to the Prairie Provinces of grasshopper map-posters for use in the control campaign of 1940 in the following editions: 4,500, Manitoba; 14,000, Saskatchewan; and 3,500, Alberta. The maps indicate in various colours the varying abundance of grasshopper eggs to be found throughout the districts infested. They allow of planning for control campaigns well in advance of the season in the several localities with definite knowledge of the intensity of the outbreak to be expected. (2) Experiments in new, improved, and cheaper grasshopper baits in Saskatchewan to determine definitely the relative values of various grasshopper bait mixtures which might be substituted for the standard sawdust-bran-water poison bait without loss of effectiveness. The studies included the comparison of such baits as those with oil, low grade flour or crushed low grade wheat and sawdust baits containing standard or cheaper poisons. (3) A survey of the wheat-stem sawfly situation in 1940 and the map of the distribution of this pest expected in 1941 as a guide to the areas in which this insect will require control and for the protection of the wheat crop in the change over from normal broad field culture to strip farming. (4) A survey and forecast of the pale western cutworm situation and prospects for 1941 that the farmers in areas likely to be infested may avoid the losses to crops by taking suitable precautions or be prepared to control the insect in fields found to be infested in the spring. The survey also is designed to save time, effort, and cost to farmers by making known the areas where no control operations will be necessary. (5) A survey of the distribution, rate of increase, and crop losses associated with the Say's grain bug to provide information in respect to the districts in which the insects are sufficiently abundant to require control activities to avoid serious crop losses. (6) Assistance in wireworm survey of the Prairie Provinces to determine the localities in which cultural practices for the control of this pest should be carried on. Unfortunately little of the loss sustained by crops from these pests is attributed to wireworms and it therefore should be mentioned that they are considered to be one of the most destructive annual controllable crop hazards in prairie agriculture.

APPENDIX I

Selected Statistics on Agriculture in the Prairie Provinces and in the P.F.R.A. Area

(Based on Census of 1936)

Item		Three Prairie Provinces	P.F.R.A. Area	Ratio of PFRA Area to Three P.P.
Total Land Area	acres	452,158,720	102,068,000	22.6
Land in Farms	acres	113,112,500	81,473,166	72.0
Improved Land	acres	60,849,957	46,925,697	77.1
Number of Farms	No.	300,523	172,541	57.4
Farm Population	No.	1,235,451	690,406	55.9
Field Crops	acres	40,194,581	30,384,798	75.6
Fallow	acres	16,854,590	13,700,008	81.3
Field Crops plus fallow	"	57,049,171	44,084,806	77.3
Native Pasture	acres	33,726,533	26,833,799	79.6
Cultivated Pasture	acres	1,578,918	1,109,835	70.3
Total Pasture	acres	35,305,451	27,943,634	79.1
Wheat	acres	24,837,824	20,609,341	83.0
Barley	acres	3,724,078	1,944,919	52.2
Oats	acres	8,674,275	5,909,925	68.1
Hay	acres	1,083,981	558,291	51.5
Other Field Crops	acres	1,874,423	1,362,322	72.7
Horses	No.	1,927,429	1,246,322	64.7
Cattle	No.	3,900,399	2,374,380	60.9
Sheep	No.	1,316,077	955,973	72.6
Swine	No.	1,833,162	899,691	49.1
Total Value of Farm Capital-		2,014,185,145	1,411,767,754	70.1

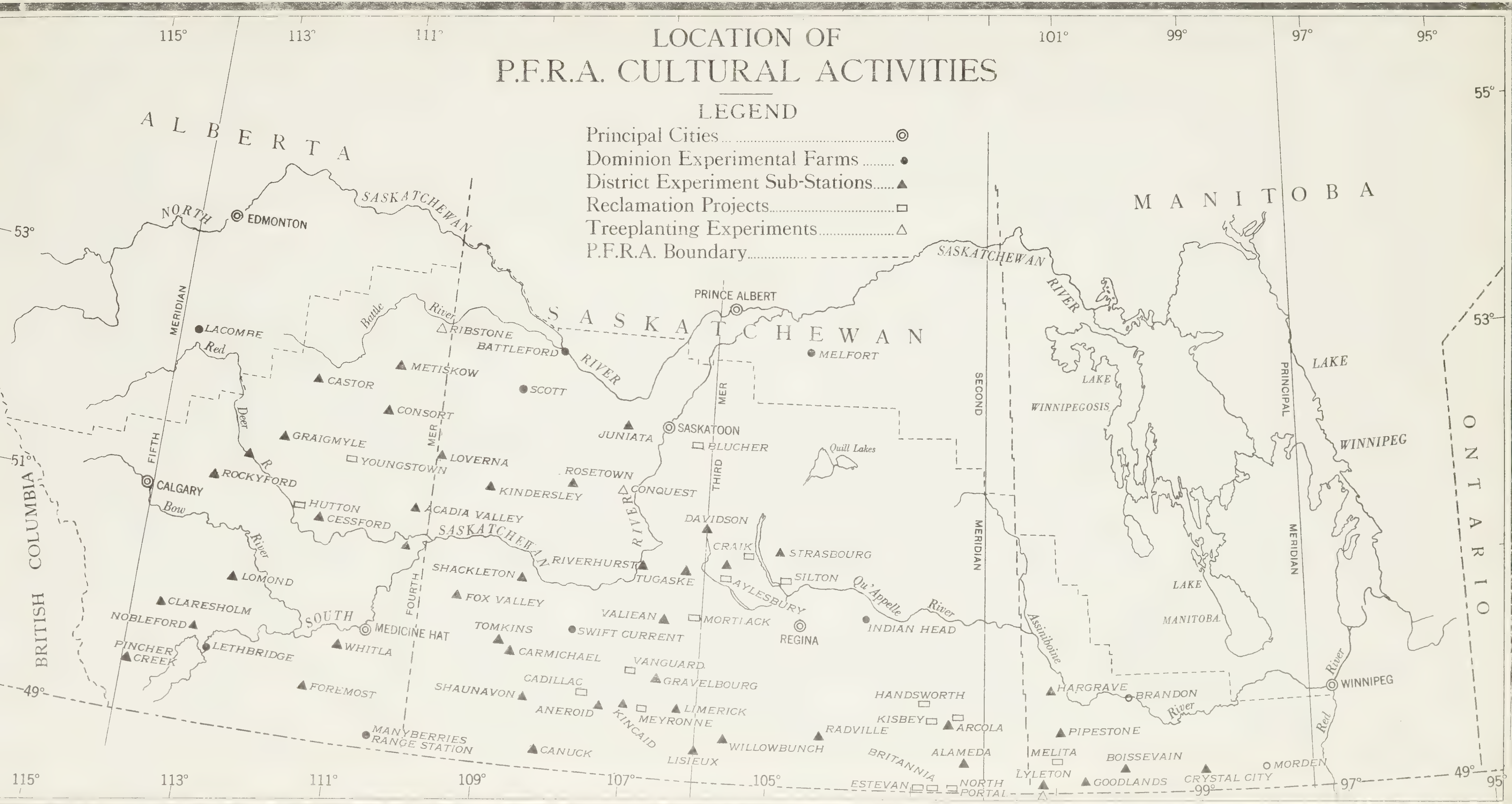
PRAIRIE FARM REHABILITATION ACT

EXPENDITURE BY ACTIVITIES

		April 1935 - March 31, 1940	April 1st 1940 - March 31st 1941	TOTAL
ADMINISTRATION				
A-1	Administration, Ottawa	(a) 18,456.26	8,288.35	26,744.61
A-2	General Administration, Regina	(b) 98,077.76	39,515.06	137,592.82
A-3	Advisory Committees	13,673.51	-	13,673.51
A-4	Aerial Surveys	79,138.27	3,214.64	82,352.91
A-5	Economic Surveys	62,833.45	41,230.61	104,064.06
A-6	Entomological Surveys	12,924.37	3,333.92	16,258.29
A-7	Educational Motion Pictures	10,785.07	-	10,785.07
		295,888.69	95,582.58	391,471.27
CULTURAL EXPERIMENTS & RESEARCH				
B-1	Administration & Publications	149,236.21	14,805.25	164,041.46
B-2	District Experiment Sub-Stations & Reclamation Stations	727,417.14	134,036.43	861,453.57
B-3	Grass Investigations, Coverage & Range Surveys	234,911.86	31,059.90	265,971.76
B-4	Tree Planting	185,078.19	37,851.40	222,929.59
B-5	Soils Surveys & Research	292,952.52	58,829.45	351,781.97
B-6	Agricultural Improvement Associations; Soil Drifting Control; Horticultural Development	(c) 275,283.21	43,813.26	319,096.47
B-7	Cultural Work on Irrigation Projects	1,510.77	16,233.76	17,744.53
B-8	Live Stock Survey & Sheep Development	5,711.74	6,596.86	12,308.60
	Distribution of Pure Seed Grain	282,594.34	-	282,594.34
	Rust Resistant Wheat	20,988.13	-	20,988.13
		2,175,684.11	343,226.31	2,518,910.42

	LAND UTILIZATION	1935 - 1940	1940 - 1941	TOTAL
C-1	Administration	(d) 70,349.47	23,460.19	93,809.66
C-2	Construction of Community Pastures	1,351,564.14	137,958.90	1,489,523.04
C-3	Management and Operation of Community Pastures	160,185.49	71,248.24	231,433.73
C-4	Purchase of Land	398,051.74	76,085.71	474,137.45
C-5	Purchase of Bulls	25,063.52	9,330.95	34,394.47
C-6	Re-establishment of Farmers	66,394.31	37,692.35	104,086.66
C-7	Drought Area Relief Administration	223,075.77	279.76	223,355.53
C-8	Seed Purchases	270,187.60	104,870.24	375,057.84
C-9	Land Preparation on Irrigation Projects	221,156.27	4,546.98	225,703.25
		2,786,028.31	465,473.32	3,251,501.63
	WATER DEVELOPMENT			
D-1	Administration	91,226.50	32,374.92	123,601.42
D-2	Small Projects	(e) 1,937,443.22	767,163.46	2,704,606.68
D-3	Large Projects	(f) 1,729,109.69	162,088.62	1,891,198.31
D-4	Water Storage	707,149.93	418,431.44	1,125,581.37
D-5	Surveys	68,233.94	62,934.39	131,168.33
		4,533,163.28	1,442,992.83	5,976,156.11
	TOTAL	9,790,764.39	2,347,275.04	12,138,039.43

(a) Included in "B"-1 to March 31, 1938
(b) Included in "D"-1 to March 31, 1938
(c) Includes $23,242.56 Agricultural Extension Work
(d) Included in "D"-1 to March 31, 1938
(e) Includes all Water Development administrative and inspection costs prior to April 1, 1938
(f) Includes $388,923.57 expended under The Supplementary Public Works Construction Act - 1935.



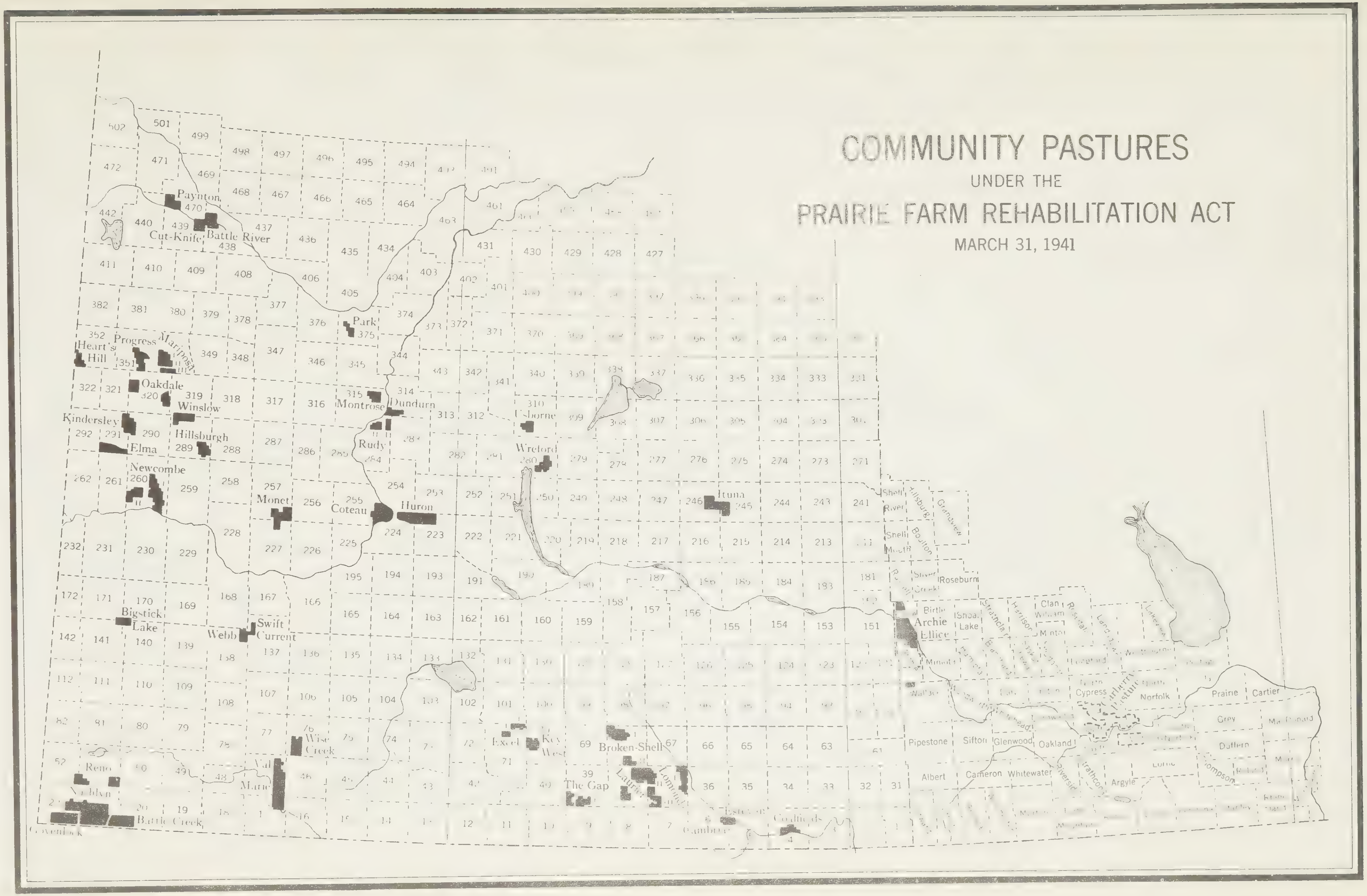
LOCATION OF P.F.R.A. CULTURAL ACTIVITIES

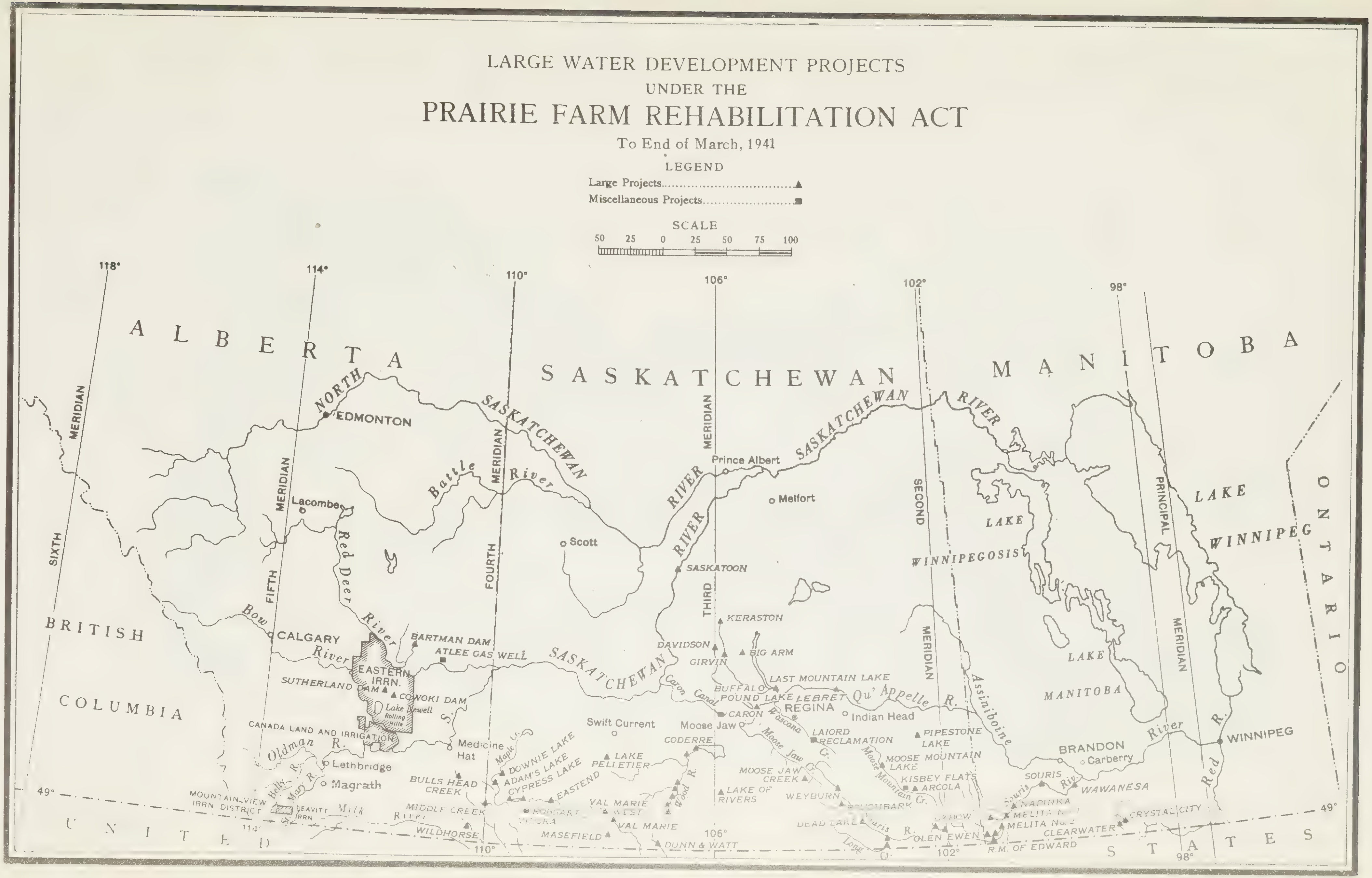
COMMUNITY PASTURES

UNDER THE

PRAIRIE FARM REHABILITATION ACT

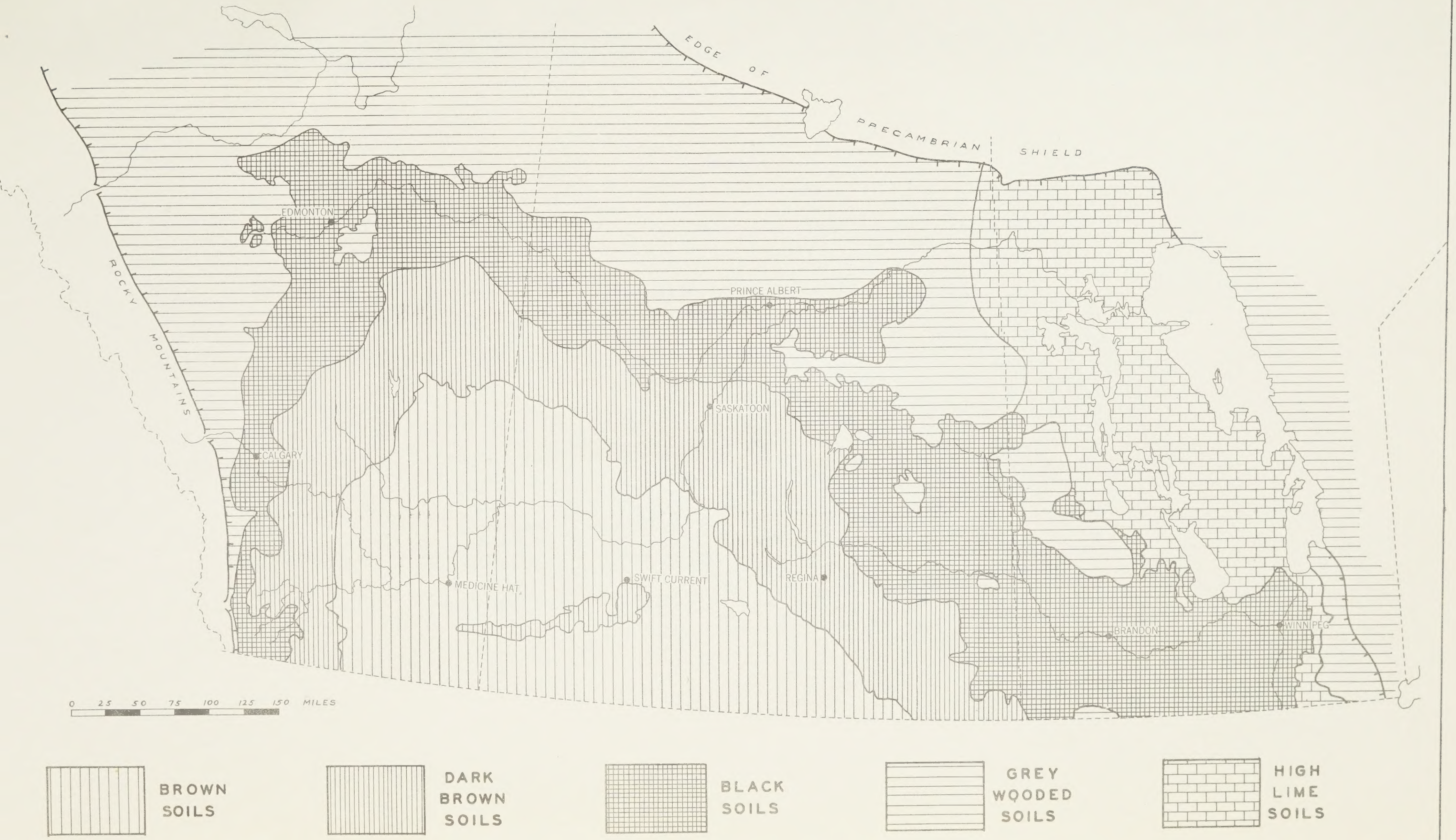
MARCH 31, 1941





LARGE WATER DEVELOPMENT PROJECTS
UNDER THE
PRAIRIE FARM REHABILITATION ACT
To End of March, 1941

GENERALIZED SOIL MAP OF THE PRAIRIE PROVINCES



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